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EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON.

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EDITORIAL NOTES.

True Trade Unionism in the Gaslight Company.

THE centenary celebrations of the Gaslight and Coke Company were continued last Saturday, when the men had their turn, by a perfect army of them—with the partners of their joys and sorrows, and in the case of the younger men, their (as the Governor, Mr. Corbet Woodall, jocularly remarked) "potential" partners—being moved down to the Crystal Palace, mostly from the north side of the Thames, for the imposing festival. There were three features about this event (an account of which appears elsewhere) that were peculiarly striking. The first was the masterly organization that enabled thousands upon thousands of the men of the Company to be absent from the works and the area of supply on a Saturday with a Sunday rest following; that provided for the transport of them all, with their wives or prospective wives, from home to Sydenham within about a couple of hours; and that arranged for dinner, tea, and other entertainment for them all—14,000 all told—throughout the day at the Palace. The Directors would desire us to make full recognition of the part that the General Manager (Mr. D. Milne Watson), the Chief Engineer (Mr. Thos. Goulden), the Secretary (Mr. H. Rayner), the Works Engineers, and the heads of departments (including specially Mr. F. W. Goodenough), took in this extensive work of organization. The second striking feature was the personal energy and discipline of the army of men that enabled all this to be done—energy and discipline exercised well before, as well as on the day, in order that the Company should not suffer the slightest ill from this "day off" of the majority of the workers. The third striking feature was the abounding evidence during the day of what the Governor aptly expressed as the great "companionship" that now exists between all the workers of the Company—from the Governor himself down to the employees in the humblest grades of service.

To the leaven of co-partnership, to the new principles it inculcates and establishes, to the new interests it creates, to the new relations it sets up through the community of interests between Board, officers, and men, to the scope it gives for institutions that bring officers and men together, the fact is due that the finest and truest of trade unions has been brought into being in the largest gas undertaking in the world, just as had been done in the South Metropolitan and other gas companies before, and as has been done since in additional cases—a trade union whose work is not militant or transient, but a trade union whose work is permanent, whose effects are cumulative, tangible, and protective, and of immense social advantage. The Company, in truth, to-day present us with a great working "companionship," every unit of which looks upon it as "our" Company. That is the right feeling to engender and to encourage. What the Gaslight and Coke Company, in all its immensity and ramification, and preceding it the South Metropolitan Company, have been able to accomplish, any other Gas Company of less magnitude can also do. No less remarkable than the commemoration of the centenary on Saturday was the demonstration of loyalty and unity. It all constitutes a reward and an encouragement to the Governor and to everyone who has had lot and part in bringing about these conditions. Ineffaceable from memory, in the case of all who were present, will be last Saturday's events at the Crystal Palace.

The Third Statutory Calorific Standard.

THERE is every reason on the part of the gas industry to be gratified at the decision of the Chairman (Mr. Charles Hunt) and the Directors of the South Suburban Gas Company, to accept the calorific power clause agreed with the London County Council, in lieu of the illuminating power standard, albeit that there are certain local authorities in the area of the shortly-to-be amalgamated districts that are still dissenting from the change. Discussion with them could not be prolonged indefinitely; and therefore the question arose as to whether the Company should drop the proposal, or make an arrangement—temporary, let us hope—that would meet the views of the antagonistic authorities. To have taken the former course, would have cut harshly against the grain of Mr. Hunt, as terms had been arranged that met the views of himself and his co-Directors, and as he has for several years been an advocate of the change to the standard quality that represents the current use of gas, and took part in the framing of the first penalty-bearing calorific power clause—the Gaslight and Coke Company's—that appeared in the Statute-books of the country. Briefly put, the clause that meets the acceptance of the London County Council, the Company, and the greater number of the local authorities in the amalgamated areas, is to the effect that the illuminating power standard shall be substituted by a nominal calorific standard of 540 B.Th.U. gross, with liability to penalty only on a lapse to below 475 B.Th.U. gross. There is a sliding-scale as to penalties. The manner in which it is suggested, with the consent of all parties, to meet the dissentient authorities is to continue in their areas the existing provisions as to illuminating power, but with a provision enabling them to, at any time, make joint application with the Company to the Board of Trade for the application to their areas of the calorific power standard instead of the illuminating power one.

The authorities concerned cannot raise any objection to this, as it maintains inviolable, at their own discretion, the position in regard to illuminating power which they apparently and mistakenly so much cherish, and at the same time gives them the option of adopting, in agreement with the Company, and by the ratification of the Board of Trade, the standard that accords with the necessities of the times. If the authorities in question have had any competent expert advice on the subject, then we cannot imagine what was the nature of the advice, nor can we believe that the authorities themselves have any proper appreciation of the position as to the better defence that a calorific power standard gives to the consumers in these times when the heating value of gas is the essential property, and not the luminous value of the gas *per se*. Experience in the other districts may produce their conversion. We trust so; and the earlier the better, as though only a single standard carrying penalties for infraction will apply in each administrative district, it will be better for all concerned to have a common standard—a scientific, practical standard, and one in harmony with the period—reigning throughout the entire area of supply.

As to the clause itself, the standard is (for the quality of gas supplied by the Company) one that in itself will be regarded as suitable, and what is also satisfactory it reduces further the terms to something that will accord with the major part of technical opinion in the gas industry. The standard of 540 B.Th.U. gross is about the equivalent of the Wandsworth standard of 136 calories gross; and there is not any substantial difference in the penalty points of the South Suburban Company's 475 B.Th.U. gross and the 122 calories of the Wandsworth Company. With the two steps made since the framing of the Gaslight Company's clause, there has been a simplification of the clause, which is to the advantage of all concerned. The Gaslight Company's standard provided for calories net per cubic foot; then in compliance with a large volume of expert opinion (in which could be counted the Metropolitan Gas Referees) in the Wandsworth clause the "net" value was compelled to abdicate in favour of the "gross" value. But there still remained the example of hybrid terminology, "calories per "cubic foot." Now in this South Suburban clause we have reached the all-British definition of B.Th.U. per cubic foot. This is the expression for which we, in common with others, have argued time and again; and the London County Council and the South Suburban Company are to be thanked for this rational concession to the major part of industrial opinion on the point. It is true that the calorimetric readings are made in calories; but it saves a lot of trouble to many people for the tester to make the one conversion

to B.Th.U. Our national unit of heat is the B.Th.U., and not the calorie. We speak and write of B.Th.U. We tell our British public that the gas we are selling them is of a value of so many B.Th.U.; and when the British public look up to see how this stands in relation to the parliamentary standard, if they find it rendered in calories per cubic foot they will wonder where they are. It is a small point, perhaps, but to the layman the big B.Th.U. figures will have a better appearance than the calorie figures. For all general purposes, our own British terms are preferable. Therefore, we congratulate the Company upon being the first in this country to adopt, with the consent of the London County Council, an all-British calorific power standard which is an advance upon the standard of the Wandsworth Company, as that one was upon the Gaslight standard by adopting "gross" value in place of "net," and by being trimmed of other of the conditions of the latter.

An Abrupt Chemical Clause Decision.

THE decision of the Duke of Bedford's Committee, and the method of arriving at the decision, to insert the chemical clause in the gas lands section of the Birmingham Corporation Bill will excite intense indignation throughout the gas industry. Here was a case that could have been properly contested in the light of the new evidence obtained since this matter came upon the stage of our industrial politics. But what happened? After hearing the opening of Mr. Honoratus Lloyd, K.C., for the Corporation, and the evidence of Mr. Alderman J. H. Lloyd, Mr. Corbet Woodall (the President of the Institution of Gas Engineers), and Mr. R. G. Shadbolt, the Committee in the lunch interval determined to insert the restricting clause without hearing the remaining evidence, without calling upon the Alkali Manufacturers' Association to justify their request for the insertion of the clause, and without the witnesses for the chemical manufacturers being subject to cross-examination by Counsel for the promoters. Until this cross-examination had taken place, the Committee could not have been in full possession of the case for the promoters. We say now with greater feeling than ever before that the manner in which this matter is being dealt with in the Parliamentary Committee rooms is a monstrous piece of injustice to the gas industry and to the public interests; the restricting action being altogether opposed to free trade in commodities of an order in which free trade is essential to the proper regulation of prices. The singular fashion in which the present decision was arrived at "caps the lot" from the evidence it affords of the present determination of the parliamentary authorities and committees to follow the lead (no matter the argument presented) set up when this question was originally sprung upon the gas industry, and before they had any opportunity to marshal the evidence in opposition to the proposal of this combination of private traders to get Parliament to confer on them special trading privileges by limiting the competition, present and prospective, with them, and so giving them the predominant control of prices for gas-works residuals.

In the case of the Birmingham Gas Department, the works at which their liquid products are treated for the manufacture of marketable commodities are at present leased to chemical contractors, who also purchase residuals from other neighbouring gas undertakings. The Corporation are therefore not now engaged in the business of working up their own residuals, although they have hitherto held the power to do so. The Alkali Manufacturers' Association, however, are futurists. Supposing the time should arrive when, from any cause, it would be good policy for the Gas Department, on behalf of the citizens of Birmingham, to directly work up their residuals, the chemical manufacturers desire to put all the handicap they can on them; and the parliamentary authorities, simply at the demand of this Trade Association, bow a ready acquiescence to the course. The residuals contractors to the Birmingham Gas Department, in order to keep their works running at an economical point, supplement (as already said) the Birmingham residual products by purchasing from other gas undertakings. Why should Birmingham hereafter (if they take over the manufacture) be placed in a worse position than their contractors of to-day? They would have to compete in the market with contractors who have no prohibition placed on them as to how much raw material they shall work up. But the parliamentary authorities, apparently quite insensible to the economic side of the question, apply the handicap to the Corporation. Then the neighbouring gas undertakings who find it a present economy to sell to the contractors to the Birmingham Corporation would, under the circumstances created by the new clause (should the Birmingham Corporation enter into occupation of their works), have to look farther afield for a market; and they would find, as things are going, all markets closed to them excepting those controlled by the affluent members of the Alkali Manufacturers' Association. Can the parliamentary authorities for a single moment seriously contend that this is in the public interests? As Mr. Woodall told the Committee, he feels the unfairness of this interruption of free commerce in residual products more on account of the small selling gas undertakings than on account of the larger buying gas undertakings. And what is important for the whole industry, and for the whole of the gas consumers of the kingdom, is that what Parliament is doing is a direct aid to the reducing of residual products' values, the maintenance of which is so essential to low gas prices.

Mr. J. D. Fitzgerald, K.C., who appeared for the Alkali Manufacturers' Association, was very candidly told by Mr. Shadbolt that he (learned Counsel) treated the matter as though the gas industry had no right to protect themselves; and truth to tell this seems to have been the attitude not only of learned Counsel, but of certain of the parliamentary authorities, throughout the piece. Mr. Fitzgerald, in his enthusiasm for the interests of his opulent clients, also tried, during these Birmingham proceedings, to draw a most absurd analogy. Mr. Shadbolt had been saying that, in his opinion, every gas undertaking should be permitted to do anything which would tend to lower the price of gas. Whereupon Mr. Fitzgerald remarked: "If this argument were "to apply, gas undertakings ought to be allowed to manu- "facture gas-fittings; but this has been expressly pro- "hibited by Parliament." It would be amusing, if not instructive, to hear Mr. Fitzgerald explain where he finds any similarity to justify analogy between gas-fittings and residual products in relation to gas undertakings. We are of opinion that he was not the author of this stupid attempt to make a parallel out of diametrically diverse conditions; and second thoughts may keep him from falling into the same error in future. The gas industry does not produce, as secondary products, the material from which gas-fittings are made; and, moreover, all gas undertakings can purchase gas-fittings, without any restriction, wherever they please—from British, German, or French makers. There are no limitations to their gas-fittings markets; and there is no possibility of any Gas-Fittings Association regulating prices with the free and open competition that exists in the markets for gas-fittings. Fair prices under such conditions must ever prevail. But through the chemical clause, Parliament is compelling gas undertakings who do not work up their own residuals to sell only to the chemical manufacturers, who, through their combination, will, with such a commercial power as Parliament with generous hand is bestowing upon them, be enabled to do practically as they please in regard to price.

Every fresh evidence of this injustice ought to further stiffen the back of the gas industry, and make it determined to fight, and to continue to fight, until the mischief that has this session been done to the industry and the country through this clause is abrogated. So acutely does Mr. Woodall feel over the matter, that he told the Duke of Bedford's Committee that he is prepared to oppose every application of the Alkali Manufacturers' Association with undiminished confidence that the decision to insert the restricting clause is wrong. That is the spirit for everyone to emulate in the gas industry; and it will only be by maintaining a vigorous campaign of defence, that eventually justice will displace the present injustice.

Since the foregoing was written, a still more serious decision has been given by a House of Lords Committee. It will be remembered that the Unopposed Bills Committee of the House of Commons refused to insert the chemical clause in the Swansea and West Kent Provisional Orders. That decision is the only ray of light that has come through this particular cloud this session. But when these two Orders came before a Committee of the House of Lords yesterday, they, at the request of the chemical manufacturers, inserted the clause in the Orders, despite the decision of the Unopposed Bills Committee of the Commons; despite, too, the fact that Mr. Campbell Cooper had brought together much fresh evidence to lay before them. The Committee absolutely closed the door on much of the evidence.

They listened to part of the general results that Mr. Shadbolt laid before them regarding the inquiries made by the Institution of Gas Engineers; but they deliberately refused to hear evidence as to the experiences in special cases. The Committee drew a hard-and-fast line at the one point: How will the insertion of the chemical clause affect the Swansea Company or the West Kent Company? That is not the point. The gas industry wants this matter treated as a question of principle and policy, and to place before the parliamentary authorities individual experiences. The latter, however, will not recognize that the gas industry is fighting not upon the ground of the immediate effect of the chemical clause in individual cases, but upon the ground of its general effect upon the future liberties and markets of the gas industry in respect of its residual products. The control of the prices of residuals by the chemical manufacturers affects every gas undertaking in the United Kingdom. Do not let this be forgotten in considering what now amounts to nothing short of a parliamentary scandal. It is rumoured that it has already been resolved to instal the chemical clause among the model clauses for next session. How far this is true we cannot say. But it all shows that no time must be lost in making another move. For this there is little time left before the summer vacation; and during the autumn sittings only public business will be taken. What it is decided shall be done must be done at once. An altogether fresh appeal must be made.

German Gas Engineers at Munich.

THE general meeting of the German Gas and Water Association, which was held at Munich in the last week of June, was in most respects as successful and interesting as the annual meetings of the Association commonly are. The attendance was as large as usual, and the festivities in connection with the gathering were on a somewhat grander scale. The Local Committee (of which Dr. E. Schilling was the most active member) carried out the arrangements for the meeting in a manner which left nothing to be desired. The Corporation of Munich extended a generous hospitality to the visitors on every opportunity; and on the last day of the meeting, when an excursion to Augsburg was undertaken, they were well supported in this respect by the Corporation of the latter city.

The communications to the meeting relating to gas manufacture and supply did not report anything of an eventful character. The best of them was the paper read by Dr. Karl Bunte, the son of Professor Hans Bunte, which dealt with the "Effect of the Nature of a Gas Supply on its Use." This paper embodied the results of a large amount of research work, conducted at the Association's experimental works at Carlsruhe, on the effect of differences in the composition and calorific power of gas on the efficiency of burners and on the adaptation of burners to different qualities of gas. The paper, of which a full summary was given in the "JOURNAL" last week (p. 40), will be very useful for reference purposes when questions arise as to the suitability of one or other quality or description of gas for the uses to which consumers will put it.

The other interesting features of the technical proceedings, in so far as they related to gas, were the account of the new gas-works in the Dachauerstrasse at Munich, given by Herr Ries, the Engineer and Manager, and the inspection of the works, including the large installation of inclined oven or chamber carbonizers which are now in action there. The impression created by this brief inspection was favourable in so far as the working of the large chambers was concerned. The incidence of capital charges, which are necessarily very heavy, on the cost of the gas made was stated by Herr Ries in the paper which was read at the meeting; and his figures were all reproduced in the "JOURNAL" last week (p. 29). Both the President of the Association (Herr F. Kordt, of Düsseldorf) and Herr Hase, of Lübeck, dealt in an interesting manner with the question of the disposal of the profits of municipal gas undertakings, and the prices charged for gas by such undertakings. A very interesting communication was that of Herr Lempelius, the head of the German Gas Publicity Organization, who showed in a very convincing fashion the advantages which the activity of the organization was bringing to the gas industry and to the public. Many of the steps taken by this organization for advertising the superiority of gas for lighting, heating, and industrial purposes are worthy of emulation by others responsible for gas propaganda.

Useful work has been done, as usual, by the Technical Committees of the Association—notably the Committee on Electrolysis, and the Committee for the Instructional and Experimental Works at Carlsruhe. The work of certain of the Committees—namely, those on Heating, Electrolysis, Technical Instruction, and the Standardization of Gasholder Construction—has, however, now reached a stage at which it may be discontinued for a time; and hence these Committees have not been re-appointed this year. The work of the remaining Technical Committees is, however, being extended; and as the demands on the funds of the Association in this direction have become very considerable, it is proposed to raise the amount of the contribution payable by the corporations and companies which are directly affiliated with the Association as extraordinary members. It is rightly argued that these are the bodies which benefit to the largest extent from the results of the work of the Technical Committees; and hence it is not now proposed to increase the subscription of the individual ordinary member, who, as often as not, contributes largely of his time and energy to the labours of the Committees.

The papers relating to water supply proved more attractive than usual to the water engineers; and lively discussions took place on several of them. Abstracts of those of more general interest are given in to-day's "JOURNAL."

Safety in Discharging Oxide Purifiers.

THE fatal accidents that occurred in 1909 and 1910 in connection with the opening and emptying of oxide of iron purifiers drew rather an unenviable, and yet a salutary, amount of notice to the conditions surrounding these operations. It must not be forgotten that they were isolated cases of fatal accident; and that the large degree of immunity from serious mishaps prior to these occurrences and since is the very best of testimony to the recognition by the responsible officials of gas-works of danger in the process, and the necessity for due care in carrying out the work. Many gas-works can boast an absolutely clean record, in regard to the firing of the purifying material, explosions, or gassing, without any special precautions having been taken in connection with the opening and discharging of oxide of iron purifiers, but merely through the observance of a few simple rules. In such cases it is generally found that the purifiers are in the open, or in open-sided sheds where, on the raising of the purifier-lids, any residual gas in the boxes is quickly blown away. Frequently, too, the boxes are allowed a little rest between the passing of gas and the opening of the lids, to allow the abatement of any heating in order to reduce the risk of overheating and firing on the opening of a box. But that accidents—fatal in a few cases, and of modest result in others—have occurred is sufficient reason for the insistence of due precautions being taken where there is apt to be neglect; and therefore there is nothing to regret that Mr. W. S. Smith, the Inspector for Dangerous Trades under the Factories and Workshops Act, has given some prominence to the subject during recent years, and has, in his reports, shown the precautions that are found effectual in various gas-works in preventing accident. Inspection, and what he has done in drawing attention to this matter, together probably with the lessons of fatal accidents, have evidently had some good result, where, we think it may be said, disregard of care existed before, though not always due to the management so much as to the infraction of rules by men and those in supervisory control.

In his newly-issued report (an extract from it was given last week), Mr. Smith acknowledges a noticeable transfer from conditions that were likely to contribute to trouble in the work of discharging purifiers to conditions that contribute to its avoidance, as well as the desire of gas engineers to bring their operations in this department to the level of the most approved practice. Open and well-ventilated sheds for purifier-boxes are becoming more and more the vogue in the stead of enclosed buildings. But some small country gas-works appear to be great sinners in the extraordinary housing or location of their purifying plant. Mr. Smith tells us that he has found purifiers provided with accommodation in retort-houses, or in close proximity to them. With such a condition, the wonder is that we have not had to record, in connection with small gas-works, more fatal accidents than we have had to do. But we cannot imagine a proper description of the order of qualification for the planning of even small works of a "gas engineer" who

would make himself a party to such a foolish and ever-risky condition. However, Mr. Smith's influence and intervention are bringing about a removal of these danger spots. It is in association with such points as this, and the eviction of naked lights from any building where there may be a chance accumulation of gas, that good work can be accomplished by inspectors in places where the elementary principles of proper planning and works method have, anyway in part, been ignored.

In the report now before us, Mr. Smith remarks upon the view of some technical gas men that bog iron ores are safer than the artificial varieties of purifying materials. This is a point that has been raised before, and by gas engineers of position. At this time of day, there must be a good stock of experience in this regard that should go some distance in, if not completely, settling this point, upon which opinion is still somewhat diverse. And we should be pleased, in the interests of the gas industry, to publish accounts of experiences bearing upon this matter, as it would be a pity, if undeserved, for the artificial materials to have a bad name imposed upon them, and their commercial position jeopardized. Mention is also made in the report of various expedients that are adopted to ensure that there is no dangerous residuary gas left in the purifiers before they are opened—such as the use of gas-indicators at the air-valves, and the blowing of steam through the boxes. The use of steam does not meet with general acceptance, principally owing to the dampness produced in the oxide. One engineer, too, has expressed the view that serious fractures may occur in the plates of purifiers by local heating produced by high-pressure steam. But low-pressure steam is frequently used, and with good effect. Blowing air through the purifiers to sweep out the residual gas is a practice that, for obvious reasons, is not followed. To increase the danger of fire owing to rapid oxidation in order to remove another danger, would not be a wise proceeding. In this relation, we have not heard that the suggestion Dr. Lessing made in our "Correspondence" columns towards the end of 1909, and supported by Mr. W. J. A. Butterfield early in 1910, has received trial in this country—that is to say, before opening oxide purifiers to flush them out with inert gases, such as flue gases. If any one has made trial of this proposal, we should be pleased to hear of it.

Radiant Heating.

READING the paper submitted by M. Lucien Bertin at the meeting of the Société Technique du Gaz, and which paper includes a compendious account of the work that has been carried out with the view to improving the means of applying town gas to domestic heating purposes, one is struck by the fact that the major part of this work has been performed in this country. Taking stock, therefore, of things in this particular direction, British workers in the field have every reason to be gratified with their contributions to the progress of the world-wide gas industry in this connection. Heating by gas would never have made any considerable headway if the *rationale* of it had not been brought to light by scientific investigation. We do not even now pretend to understand all about it. But this we do know, that the light thrown by investigation has enabled an efficiency to be attained that has never before been reached, as is shown by the heat-balance one is able to construct from temperature determinations; and moreover an attainted reputation has been, through the same knowledge divulging course, relegated to a place in the past, and a new and excellent reputation has been set up, and is very rapidly expanding. The courses that have brought us to the present satisfactory position are the ones that must be still pursued if the gas industry is to reach the zenith of its ambition in this matter of gaseous heating.

There is much more that we have to learn—for instance, about gas-fire flames and fuels. We know, for instance, that the lower the aëration of a flame to secure complete combustion, the greater the flame temperature. We know, too, that the larger the flame, and the less the aëration, the greater the percentage of the heat radiated from the flame itself. It is not a question here of the amount of heat capable of being radiated by a flame *per se*, but the amount of heat capable of being radiated by the fuel surrounding the flame. A low-temperature flame may be used; and, according to the nature of the fuel employed, a higher radiating efficiency may be obtained than by a higher temperature flame and a different variety of fuel. It seems pretty clear that the relation of flame to fuel, and the essential characteristics of each, supply together the profitable direction in which work has to be carried further. Given proper fuel, high-temperature flames should provide the greatest efficiency in useful heat, seeing that the high flame temperature, at ordinary gas pressures, denotes a smaller volume of heat-absorbing nitrogen introduced with the air required for complete combustion, and therefore a lessened volume of products of combustion sweeping away, and carrying heat with them, to the flue-pipe. If the heat units that escape by the flue-pipe can be reduced (though ventilation is entitled to, and must have, some portion of them), and are converted into useful radiant heat, so much the better in the cause of economy.

We do not quite know whether M. Bertin is speaking reproachfully when he says that the manufacturer of the modern gas-fire has not attempted to make use of the heat carried away by the products of combustion. The makers of older types of gas-fires did; and the results were not convincing as to advantage. The work has proceeded on the right lines in lessening the escape (*viâ* the flue-pipe) of heat units, while leaving sufficient to promote ventilation, for which purpose 20 per cent. of the total heat of the gas is not necessary. This line of work is distinctly preferable to attempting to extract heat from the products of combustion, which could only be conveniently utilized by heating air; and already (with about 50 per cent. of the heat given off being radiant, and 20 per cent. passing away by the flue) 30 per cent. is made use of in this way. It is suggested by M. Bertin that the heating of apartments by hot air is the more economical system. With all deference, it does not trouble us much if it is. The gas industry finds it serves its own interests best by preventing a recurrence of the discontent that was produced by the old system of greatly reducing the humidity of the air, and of transforming the conditions of an apartment into less wholesome ones than they are at present under gaseous heating, with the increased percentage of radiant heat. That this percentage is good to-day is confirmed by M. Bertin's tests, which show that close upon 50 per cent. radiant heat is obtained with bunsen burners and columnar or bar fuel, though the bunsen burner and iron frets exceed this. But an objectionable smell on lighting up is, in his opinion, fatal to the popularity of the latter.

Gas Workers and Unemployment.

In other columns will be found the report of the Committee deputed by the Gas Companies' Protection Association and the Institution of Gas Engineers to obtain decisions as to gas workers from the Umpire appointed under Part II., or the unemployment section, of the National Insurance Act. There is one word of warning to be uttered in connection with the report. It will be noticed that, in discriminating between gas-works employment that may and may not come under Part II. of the Act, the Committee use safeguarding expressions, which show that in places they are speaking indefinitely, while in other places they are able to speak with greater positiveness. It must not be taken therefore that in all respects the discrimination made in the report has received the imprimatur of the Umpire, though the Committee are of opinion that, so far as the report goes, it will be found to be substantially correct. There may, however, be, and probably are, some questions of which the report does not dispose. Our readers will be able to check the report week by week as the decisions of the Umpire are published in our columns, as extracted from the "Board of Trade Journal."

Lighting of Factories.

There is evidence of a progressive tendency in the lighting of factories and workshops, according to the report on the subject of Mr. D. R. Wilson; and it is also manifest that this progressive tendency must have set in before our friends the illuminating engineers came on to the scene. Occasionally, Mr. Wilson (the publication of extracts from whose report is concluded by us this week) finds that there are badly lighted places in factories; but, on the whole, employers and workers both seem to be more alive than ever to the advantages of good lighting in manufacturing establishments, in connection with output, and the prevention of accident. There is no doubt the force of example plays a large part, too, in improvement of this kind, through manufacturers seeing what others are doing. In the various industries the factories of which have been examined, the choice between modern gas lighting and

electric lighting appears to be fairly well spread. In some industries modern inverted burners, both high and low pressure, have far and away the superior place in preference; in others electric lights obtain some slight predominance. Mr. Wilson refers to the extensive installation of the high-pressure gas system in cotton mills; and he commends the inverted gas system for factories on account of the downward light, and the absence of shadow. He finds that carbon filament lamps are still, despite their uneconomy, in use in some establishments, on account of the destruction of metallic filament lamps through constant vibration, though here again experiences differ.

Some Considerations.

In expressing the opinion that there is little choice between lighting by modern systems of incandescent gas-lamps and electric incandescent lamps, Mr. Wilson refers to the constancy of the electric light, and mentions that it requires a small amount of attention; while, *per contra*, he gives credit to the modern gas systems for producing a white and more powerful light, and light where it is wanted. Slight attention will keep the light of inverted burners perfectly constant. He is of opinion that a small depreciation of light in the case of gas-burners is due to mantle deterioration. If he studies the matter carefully, he will find that, where depreciation of light has been observed, it is more probably due to a little obstructing dust in the burner, as mantles, especially inverted ones, frequently run long periods, without any appreciable deterioration. On the point of vitiation of atmosphere, he points out that, in modern systems of gas lighting, the consumption of gas is so small, and the combustion so complete, that the effect on the air is minimized. We would suggest to Mr. Wilson that some observers have found that, with simple ventilating apertures at the top of workrooms, owing to the currents naturally set up by gas-burners, the percentage of carbon dioxide in the air of rooms where people are at work, is sometimes less after the gas is lighted than before—without the use of any mechanical ventilating arrangements. It is also growing knowledge that the high intrinsic brilliancy of electric lamps is more harmful to the eyes of workers in factories than the lower intrinsic brilliancy of the gas mantle with its larger incandescent area. Taking these points into consideration, Mr. Wilson will no doubt be prepared to agree that from the hygienic point of view, as well as that of economy, he might have said more than he did that was favourable to incandescent gas lighting. However, there is no occasion to complain of the attempt in the report to take an independent and unprejudiced stand. But we do commend to his notice the question of so-called air "vitiation" in relation to natural laws, and the one as to whether "vitiation" by pure carbon dioxide is really a matter of consequence until it reaches the limit where the human being is physically incommoded. Modern investigation has extended knowledge on this point; and we hope the results of such investigation have not been overlooked in quarters that have any real influence in connection with factory illumination.

The Latest Municipal Results.

Among the reports which have recently come to hand of the working of municipal gas undertakings for the past financial year, there is further evidence of prosperity to be noted. At Belfast, nearly 2½ per cent. more gas was made; and various economies in working were secured. In aid of the rates, £10,000 has been contributed, in addition to £11,355 for dividends and sinking fund of the new City Hall. The gross profit is very near the record of 1906; while the cost of coal in the meantime has increased by 1s. 8d. per ton and other materials have gone up, and a substantial increase has been made in the discounts to consumers. Bradford suffered from the closing of works on account of the coal strike; but the amount of gas sold was practically the same as in 1910-11. During the past year the wages of almost every class of workmen were advanced, while the cost of nearly all kinds of material went up; but the Committee were again very fortunate in the placing of their coal contracts. There was a slight falling off in consumption at Edinburgh, and the rental was further affected by a reduction in price. Residuals realized more, and the expenditure was less; so that there was a larger gross profit. A record surplus is recorded from Kendal, and gas is at a moderate price. A useful sum is handed over to the rates; and this is a remark which applies also to Oldbury. There was an increase of 3·35 per cent. in the quantity of gas made at Oldham; and the make per ton was larger. A big increase was experienced in the consumption of gas in cotton mills, but that used in other works shows an even larger falling off. In the case of Padiham, the gross cash value of the residuals was equal to 85 per cent. on the cost of the coal; and in this connection the Manager, in his report, refers to the question as to the wisdom of obtaining high yields of gas from the coal, with the probable sacrificing of residual products. This is, he says, a matter which local conditions will always determine; but with the prices at present obtaining for residual products, he is inclined to think that in his case no good could result by striving for these high yields. Some decrease in the sales of gas was experienced at Salford, due, however, to exceptional causes. Southport sold more gas; and from the profit on the past year's working £13,000 is to go in aid of the rates. High-pressure lighting is giving entire satisfaction in the town. The output of gas increased by close upon 3 per cent. at Teignmouth. During the year the price of gas was reduced, and the advisability of making another reduction is to be considered after the coal contracts have been decided. Less coal was carbonized, and substantially more gas was made, at Workington. A round sum is to be handed over in relief of the rates; and the price of gas is to be reduced 1d. per 1000 cubic feet.

Employers and "Peaceful Persuasion."

Some eight months ago, the Employers' Parliamentary Council presented to the Prime Minister an influentially signed memorial on the subject of the Trade Disputes Act and the Labour Union Conspiracy. In this, attention was called to the grave evils which have arisen in consequence of the Act, and to the "present combination of Labour Unions for the purpose of promoting national strikes fraught with incalculable loss and immense suffering to the community." The effects in practice of the "peaceful persuasion" which the law allows were referred to, and also the results of relieving Labour Unions of responsibility for their actions during trade disputes. It was urged by the memorialists that picketing should either be rigorously suppressed, or the number of pickets should be limited to two, and such pickets should be required to wear a distinguishing badge and to attend only where a person works or carries on business; that unions, whether of workmen or masters, should be subjected to the ordinary law of the land, and made responsible, like all other classes of the community, for their actions; and that a federation of unions for the purpose of "paralyzing the country" by means of a general strike or lock-out, throwing all industries and communications into disorder, and stopping the food supplies of the nation, should be suppressed as an unlawful combination, and immediately so proclaimed. At the same time the Prime Minister was asked to receive a deputation of the representatives of the Associations whose names were attached to the memorial. But Mr. Asquith was too busy to receive a deputation, and suggested that a written statement of the views of the Council should be sent to him. It did not seem to the Council that this would meet the requirements of the case; and later on another request was made to the Prime Minister to receive a deputation. Once more Mr. Asquith regretted that, "owing to the great pressure on his time," &c.; and now the Council have written telling Mr. Asquith plainly that they think he does not realize the gravity of the position in which employers find themselves, and with regard to which they ask Parliament to so amend the law that the evils of picketing may be suppressed and the right of freedom to work pass unchallenged. Having, the Council conclude, been denied the opportunity of placing their views before him, as representing the Government, while audiences are freely accorded to Labour Unions at all times, they must resort to the Press for the purpose of giving publicity to their case. The present lamentable state of affairs in the dock district of London is alone sufficient justification—and there is also much more—for unceasing endeavour to secure the repeal of the Trade Disputes Act.

Nitrate of Soda.

At the end of last year, there was a general expectancy in the market of a large consumption of nitrate of soda in Europe during the season then about to commence; but, in their half-yearly report, Messrs. Montgomery and Co. say they doubt if anyone dreamt of such a satisfactory ending as is exhibited in the figures which are now available. From January to the end of June, the consumption of nitrate of soda in Europe (at 1,362,000 tons,

against 1,215,000 tons) shows an increase of 147,000 tons, or 12 per cent. Of the total consumption named, Germany accounts for about one-half, the increase in the case of that country being equal to 22 per cent. The consumption in France and Holland also advanced; while the United Kingdom is about stationary, at 86,000 tons. The American consumption, which exhibits a decrease of 16 per cent., while a disappointment to those who had great expectations of a large demand, must, it is pointed out, have proved a distinct advantage to the European consumer; for had American shipments in November and December, 1911, and January and February last been the same as in those months of 1910 and 1911, it can only be surmised that the market throughout the season would have ruled very much higher, and that there would not have been sufficient nitrate to meet the demand and retain a stock. This falling off in America is, however, regarded as being merely temporary. From countries outside Europe and America, the demand increases year by year; and on this occasion the growth is from 38,000 to 49,000 tons, or 29 per cent. For the twelve months just ended, the world's consumption is placed at 2,460,000 tons, against 2,324,000 tons, or an increase of 5·8 per cent. The visible supply for Europe is calculated at 313,000 tons, compared with 346,000 tons a year ago. The course of prices over the past six months has, it appears, been for the most part consistently upward. Early in January, the value of arrived or due cargoes was about 9s. 1½d. per ton, cost and freight; while the f.o.b. price in Chili was 7s. 4d. to 7s. 5d. per quintal for prompt shipment. During June, season's cargoes, October-November sailing, were done at from 10s. 4d. to 10s. 4¾d. per cwt., cost and freight; and the market, after being easier, had at the close a hardening tendency. Looking at the future, the opinion is expressed that there is every justification for believing that prices will not only be maintained, but that higher ones will rule if the consumptive demand for the article in the coming twelve months is to be on the same scale as that of the past year. But should the American demand revive, as is generally anticipated, one might reasonably expect to see materially higher prices—always provided that nothing more than a moderate increase takes place in production during the next eight or nine months.

A BIG FIGHT ON THE CHEMICAL CLAUSE.

Swansea and West Kent Gas Orders.

THE above-named Provisional Orders were considered yesterday by a House of Lords Committee, presided over by Lord Clinton; the former being dealt with first. Both of these Orders have been passed by the Unopposed Bills Committee of the House of Commons—a suggestion of the Board of Trade at the time that a chemical clause should be inserted being refused. Since then, the United Alkali Manufacturers' Association presented a petition against the Confirmation Bill, and asked for the inclusion of the same chemical clause as that inserted by Lord Ritchie's Committee in the South Suburban Gas Bill. The Swansea Gas Company strongly opposed this, and evidence was given by the Manager of the Company (Mr. George Thornton Andrews), Mr. R. G. Shadbolt, Mr. E. H. Stevenson, and representatives of a number of small gas undertakings in the neighbourhood. The main point of all the evidence was the injury which such undertakings would suffer in being prevented from selling their ammoniacal liquor to larger gas undertakings.

The CHAIRMAN, in giving the Committee's decision on the Swansea Order, said: The Committee are of opinion that this Order should proceed, subject to the insertion in it of the clause which has been submitted to us by the petitioners; and we wish further to say this—that, while we do not regard the decisions which have been given on certain other Bills of a similar character which have been before Parliament this session as necessarily governing all cases which may come up, we think the promoters have failed to show such an essential difference between this case and the others that the precedent should not apply.

In answer to Mr. BALFOUR BROWNE, K.C.,

The CHAIRMAN said the restriction involved by the clause would apply not only to the new land in the present Order, but to the Company's existing land and works. He sympathized with the promoters in the fact that the Committee were taking away a power which had already been given to them by Parliament last year.

Mr. BALFOUR BROWNE said that, speaking without any disrespect to the Committee, it would be a question for the Directors of the Company to decide whether they would take the Order. They might come to the conclusion that it was so serious a matter that they would not take the land for the new works, but go on with their present site. He added that he thought the Committee's decision also governed the West Kent Order.

Both Orders were then reported for third reading.

A full report of the evidence will appear next week.

NOTES FROM WESTMINSTER.

PROCEEDINGS in connection with gas measures have now, for this session, been reduced to little more than a pure formality; and, with little incident, there is a rapid movement towards the close, as is seen by the batch of Bills that have up to the present passed through the Committee stage in both Houses.

Chemical Clause. There seems to be something almost in the nature of a conspiracy in Parliament in connection with the insertion of the chemical clause in Gas Bills. It had been hoped the Duke of Bedford's Committee would have dealt with this matter in a judicial spirit when raised before them on the gas section of the Birmingham Corporation Gas Bill. But they only heard the case of the Corporation; and gave a decision without calling upon the Counsel for the Alkali Manufacturers' Association to address them, or to call witnesses to justify the insertion of the clause. There was no chance therefore to interrogate the witnesses for the chemical manufacturers in the light of the fresh evidence that is available. The clause has been imposed upon Birmingham. Comment appears elsewhere.

Calorific Power Standard. The South Suburban Gas Company have agreed the terms of the calorific power standard that it is proposed in their case shall supersede the illuminating power standard. All the authorities, with, we believe, the exception of two or so, have agreed to the terms; and, this being the case, the Chairman, Mr. Charles Hunt (who has long held the opinion that calorific power should displace illuminating power as the standard of quality), and his colleagues of the Board of the Company, are proposing to adopt the clause, excluding from its operation the malcontent authorities, but making provision for them to come in should they so feel inclined without any need to again approach Parliament in regard to the matter. The disinclination of some authorities to accept the clause is incomprehensible in this year 1912. However, perhaps wiser counsels will yet prevail, and there will be an early acceptance of the clause, the main terms of which are alluded to in our editorial columns.

York Purchase. When the Bill of the York Gas Company came under the consideration of the Unopposed Bills Committee of the Commons last week, it was found that, since the measure was before a Committee of the House of Lords, purchase terms have been agreed with the Corporation. Notwithstanding that the civic authorities are owners of the electricity undertaking, they are desirous of obtaining possession of the gas undertaking, though they did not show any case in the Lords carrying conviction that the citizens would be better off under the administration of the works by the Corporation than under the Company. The agreement is subject to endorsement by the proprietors on Oct. 1 next, and to the passing of a Purchase Bill in the next session of Parliament. We do not know what has induced the Directors to arrange these terms with the Corporation; but probably a good explanation will be forthcoming in due season. Meanwhile, it is interesting to note that the bargain includes the payment to the proprietors at the rate of £102 per cent. for the £370,000 ordinary capital and for the £50,000 of preference capital. Whether the proprietors will be satisfied with these terms remains to be seen.

Pipes in Private Roads. Several Gas Bills have been before the Unopposed Bills Committee during the week; and a few novel points have cropped up in connection with them. It transpired that a new clause has been introduced in the York Bill (which, of course, goes forward in order to prepare the Company in the event of any failure of the purchase scheme), providing for notice to the Corporation of the laying of gas-pipes in private roads, and approval of their position in such roads. This is an unusual provision. The Corporation, however, pleaded that they would be taking over the private roads at some future time; and therefore they ought to have some voice in what was done anterior to that event.

Varying the Reserve Fund Clause. The Herne Bay Company have managed to convince the Unopposed Bills Committee through Mr. William Cash, that they deserve the variation from the normal reserve fund clause as proposed in their Bill. The Model Clause, as is well known, provides that "where in any year the dividend of the Company on the ordinary capital shall exceed the standard rate, by reason of the price charged by the Company being below the standard price, then out of the amount of the divisible profits of the Company *applicable to the payment of such excess dividend*, the Company may in such year set apart such sums as they think fit," &c. The clause in the Herne Bay Bill will give the Company power to provide a reserve fund not from the sum divisible as excess dividend, but from any divisible profits. The vital words of the clause are simply these: "The Company may in any year set apart out of their divisible profits such sum as they think fit by way of a reserve fund," &c. There is liberty in these words.

Gas-Fittings. The "Power to Supply Fittings" clause in the Ashbourne District Council Bill has been extended, so as to prevent the authority doing any gas-pipe work on the consumers' side of the meter, or selling any fittings except through a contractor. The business it is also ordained shall be carried on so that the receipts balance, or are in excess of, the expenditure. Meanwhile, the municipal electrical people are trying to get Parliament to permit them to wander, in respect of electric wiring and fittings, outside these limitations.

Centenary Medal.

1812-1912.

CENTENARY CELEBRATIONS

OF THE

GASLIGHT AND COKE COMPANY.

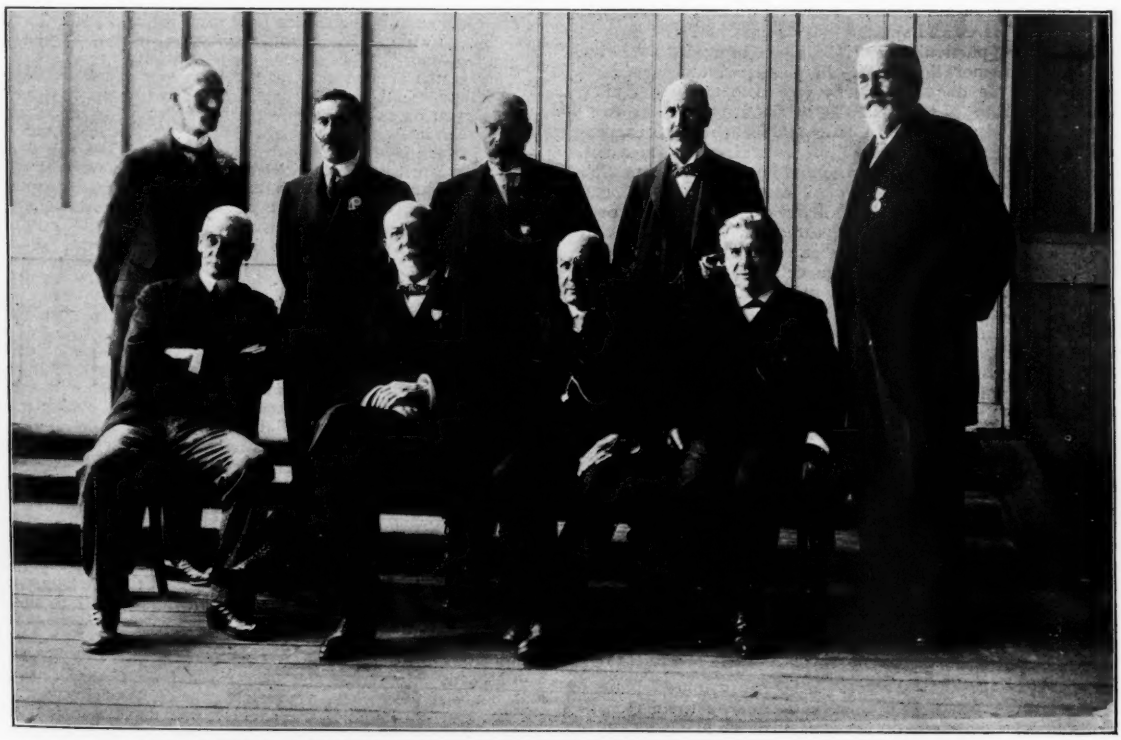
Fourteen Thousand Employees, Wives, and Sweethearts

Entertained at the Crystal Palace.

Centenary Medal.

UNDER a blue, unclouded sky, and in some cases through tubes beneath the busy streets of London, between the hours of ten and twelve o'clock on Saturday morning, numerous special trains and ordinary ones were conveying thousands upon thousands of happy visaged men and women to a common destination. This destination was the Crystal Palace on the heights of Sydenham Hills. The day was the one set apart for the celebration by the men and their wives and sweethearts of the centenary of the foundation of the Gaslight and Coke Company, which vast concern gives the heads of so many thousands of families the means of earning the wherewithal to maintain themselves and their wives and children, and in which concern the majority are now co-partners. This is the first celebration of the kind that could have been held in the world's gas industry by the rank-and-file of the workers of any gas undertaking; for in the Gaslight and Coke Company the gas supply industry had its origin. Therefore such a gathering together of the workers and those for whom they labour to commemorate the foundation of the Company, and of the industry, was an event of which the men were exceedingly proud. They have never had such an opportunity for a massing of their forces on any occasion before; and of the army they presented when all the train-load units were brought together at the Palace was again something of which they were proud. Did the men know what was meant by this centenary celebration? We had no occasion to make inquiry for an answer. It was depicted everywhere in the faces, dress, and demeanour of centenary-medal and coloured-badge bedecked men and their fair companions. They realized it all to the full; and to-day they wish that centenary celebrations could occur annually instead of only once in some life times, and never in those that begin and terminate intermediately. The large army of men entered into the celebrations all the more enthusiastically because co-partnership has brought to them new interests in their Company and in their employment. Between them, the Board, and the officers a new order of things has been established, and has now been so long experienced, that the men know and feel that for them the new *régime* is permanent. In proximity as many of them are to a centre of extreme labour and socialistic activity, they are proof against all the insidious workings of those whose main object appears to be to keep capital and labour in a state of perpetual enmity.

These were the well-groomed, well-knit, and healthy complexioned gas men who were out to commemorate the centenary's service in London of their Company; and they had meant to make, and did make, the day what it was intended to be. Meeting the General Manager (Mr. D. Milne Watson), he told how enthusiastically the men had looked forward to, and had worked for, the day; meeting the Chief Engineer (Mr. T. Goulden), he told how the works' men had laboured with voluntary will to put every cubic foot of gas they could into the holders, and how as the



THE GOVERNOR, DIRECTORS, AND CHIEF OFFICERS OF THE GASLIGHT AND COKE COMPANY.

[*Front Row* (left to right) Mr. Ulick J. Burke, Mr. Corbet Woodall, Mr. John Miles, Sir Hugh Owen, G.C.B.
Back Row (right to left): Mr. James D. Walker, K.C., Mr. Herbert J. Waterlow, Mr. J. L. Godlee, Mr. D. Milne Watson (General Manager), Mr. Thomas Goulden (Chief Engineer).]

A VIEW IN ONE OF THE DINING-HALLS AT THE CRYSTAL PALACE ON SATURDAY.

last shifts had left early in the morning the lifts of the holders were mostly up to their extremities; meeting Mr. F. W. Good-enough, the Controller of Gas Sales, and Mr. H. S. Reeson, the Distributing Engineer, they each told how the men of their respective departments had worked so as to leave no imperative job to do on Saturday. Saturday was centenary commemoration day; and the men who could take part meant to have it so, and as near as possible make this Saturday of Saturdays the equivalent, as far as gas-making was concerned, of a Sunday, and to have practically the same cessation of work on two succeeding days. They did it; and were not late for their allotted trains on the Great Eastern line, the London, Tilbury, and Southend and District lines, the Hampstead tube, the Waterloo Tube, the Metropolitan Line, the London and North-Western Line, or the London, Brighton, and South-Coast Line. The Secretary (Mr. H. Rayner) mentioned that individual punctuality contributed largely to the ease with which such large bodies of guests were brought to the Palace, and therefore contributed considerably to the success of the day.

The Numbers Present.

Not all the employees of the Company were there. There had had to be some sort of limitation. The total number present was about 7500; and wives and sweethearts made a further 6500—so that, without being particular to a few, 14,000 represents the total number on commemoration bent. From the works there came 4250 men, from the chemical works 500, from the distribution department 300, from the Gas Sales Department 1900, from workshops connected with this department 350, from the stores, prepayment meter department, &c., 150. Therefore, to be exact, there were 7450 men present. All who had been in the Company's service three years and upwards were invited; but if unfortunately prevented by the exigencies of duty, every man of over three years' service was given 7s. 6d. extra pay for the day, and those under three years' service 5s. extra. Incidentally, it may be mentioned that in anticipation of the centenary, the Directors have also made certain concessions in regard to holiday pay. Every officer and all the workmen have been presented with a (bronze) centenary medal—the officer's ribbon being striped blue and white, and the men's ribbon dark blue. Excepting the chief officers, and the heads of departments and members of staff who were acting as stewards at the Crystal Palace, the staffs were on duty to see that the huge district of London north of the Thames was properly supplied with gas, and to ensure that any work urgently required was properly handled.

At Dinner.

On arriving at the Palace, we found the commemorationists already dining; and there was for us an immediate interest in the catering arrangements. Messrs. Lyons and Co. have never had to provide dinners for 14,000 people on a single occasion before; but they were equal to the task. Dinners were served at 12, 1, and 2 o'clock in eight distinct places; so that in all twenty-four parties sat down. The Garden Hall, the Popular Room, the Restaurant, the Concert Room, the French Room, the Excursion Room, the Terrace Café, and the Skating Rink were all brought into use for the purpose. Different coloured badges (colour representing room) with different letters on them (representing the hour) was pinned on the coat of every man; and this was the passport for himself and partner. The Governor of the Company (Mr. Corbet Woodall), the Deputy-Governor (Mr. Ulick J. Burke), and their directorial colleagues, with the General Manager and Secretary, made a tour of the rooms, while dinner was proceeding; and they were heartily acclaimed everywhere. The Works' Engineers and the heads of departments took the chairs at the several dinners. But their duties were light, with all the guests hearty co-operatives in dining and in enjoyment. There were only two toasts at each dinner—"The King" and "The Gaslight and Coke Company;" and right enthusiastically they were honoured. We happened into one of the rooms while the latter toast was being given; and the very roof rang with the applause. As every lady guest left the rooms, she was presented with a box of chocolates, and every man with a box of cigarettes.

A GREAT MEETING.

In the theatre at three o'clock, there was a meeting of the representatives of the men. Admission was only obtained by a special ticket; and the special tickets had been obtained by ballot, as it was impossible to find an enclosure within the Palace where 14,000 people could at one time hear speeches. The floor of the theatre was crowded in every part; and when the Governor and his colleagues filed in, accompanied by the chief officers and members of the staff present, the continued cheering prevented the immediate rising of the Governor from his seat to commence the proceedings.

An Extempore Address.

The Governor, when silence once more reigned, said: On the programme you will see the dreadful announcement—"3 to 3.30. Address by the Governor." Yet here you are with a kindly reception for me, in spite of the announcement. I believe that you know me better than to suppose that, on a day like this, and with the attractions awaiting you outside, I am going to inflict on you a long speech. I have no such intention. I understand that you are a representative body—unfortunates [laughter] deputed by some method of selection to represent the larger body who are outside enjoying themselves. At any rate, I am glad to see you; and, in the name of my colleagues and myself, to express our welcome to you on this auspicious day. [Hear, hear, and cheers.]

This is a Great Day for our Company.

But, as I have said, my colleagues and I did not invite you here to-day to listen to long speeches. It is neither the place, nor the time. We do, however, wish to say that we rejoice with you in the prosperity attending our Company—our joint undertaking, let me say—at the end of 100 years of hard working life. [Applause.] When we were considering how we were to keep this day, a great many suggestions, I need hardly tell you, occurred to us, and were offered to us. In one sense, we would all have preferred if we could have had some more permanent memento of our centenary. But I am not sure after all whether a building erected by hands, although permanent and enduring beyond our lives as individuals, would really be of more enduring value than the memento which attaches to a gathering like this, when friends meet friends, and when mutually sympathetic hearts beat together in a bond of common friendship.

In Days Past.

In looking back over this long period, it is natural one should think very much of what were the conditions of things at the time when our Company was launched; and I refer to it because I think it will be found there is a great deal of consolation, encouragement, and help in the retrospect. Our Company was formed at a time when the country was in a state of fearful anxiety with regard to affairs at home and abroad. You know that the echoes of the cannon at Trafalgar had but just died away, while the guns of Waterloo had yet to speak. The condition of the country was deplorable in many respects. I find the earliest stokers of the Gaslight and Coke Company (who were, of course, the best paid men of their class) were, at that time, receiving 26s. per week—a week consisting of seven days of twelve hours each. The pay of a labourer in the country—and there were far more labourers in the country then than now (far more than in the towns)—was from 7s. to 8s. per week. The price of a quartern

loaf was 1s. and upwards. Men in those days never ate wheaten bread, because a whole week's wages would have only purchased some half-a-dozen quartern loaves. Liberty was in chains.

HUMANE CHANGES.

Since the commencement of the century, we have had evidence that those chains have been removed. This has been seen in the abolition of the slave trade, in the reform of the prisons, and in a score of different ways—such, for example, as the mitigation of constraints on religion. In all these ways, there has been evidence everywhere, and in every way, that a wiser and a more Christian spirit prevails. But among all the improvements that have taken place, those affecting the lives and the work of the working population have been the greatest. Take the repeal of the corn laws and the navigation laws, the taxes upon knowledge, the regulation of the relations between employers and employed, the greater care of young children, and the protection of women, and the removal practically of all the duties upon necessary articles of food and life. I may cite, too, the Workmen's Compensation Act, and other legislation of that character. All these things have operated to social betterment. What I desire to do, however haltingly, is to point your attention to the fact that while there may be very much yet to do in order to bring about the new heaven and the new earth to which we are looking forward, the history of the century is full of encouragement with regard to what we may hope for in the future. We have more reason, I think, to be proud of those humane improvements that have taken place than we have even of the immense scientific and mechanical inventions which have distinguished the century. And I feel sure that, if we advance hand in hand, further improvement to which I look forward, and to which I know tens of thousands are looking forward with confident expectation, will be more quickly and more easily accomplished.

THE BRUTAL METHOD.

This century of ours is a record not only of a great industry established, but I may also say of a great victory won. We have fought a good fight, not simply in order to establish ourselves as one of the great industries of the world, but we have fought against the spirit extant at the commencement of the century, and extant also to-day—the spirit that seeks to breed mischief and discord, instead of harmony and good feeling. If a sense of duty permeates employers and workers and especially in so far as the two parties are merged into one as in our co-partnership, there will be a sense of mutual obligation, and, let me say, that that mutual obligation means on the one side fair work, freely rendered, and on the other pay sufficiently generous freely given. [Hear, hear.] There is—we know it quite well, and there is no occasion for blinking it—a disposition in the country up and down everywhere to paint the two interests as mutually antagonistic. We do not believe that at all; and we seek to establish a better belief—viz., that the two are mutually helpful. Miserable, devastating strikes are a brutal way of attempting to settle differences. The effects of such strikes are not limited to the people who cause them. They extend to many industries that have nothing whatever to do with the causes of the trouble that originated them; and, gentlemen, is it not a fact that many a child goes supperless to bed because of quarrels between people whom its own parents never saw or even heard of? I remember speaking at Beckton some little time ago, and saying there that the folly of this method which has found so much vogue and favour in recent days lies in the fact that almost invariably a dispute is eventually settled by reasonable discussion and arbitration after all the misery, distress, and trouble have been endured. Is there any reason—there is none whatever—why the settlement should not be reached before rather than after all this suffering? ["No," and cheers.] I would ask you to beware of those men of whom there are some who delight in fighting for fighting sake. ["We won't have them, Sir."] I am glad to hear you say so. [Cheers.] I am not one who objects to a fair stand-up fight when the occasion calls for it; but only between man and man, without involving the wives and children. The methods to which I have referred involve injury to, and often the wreck of, industries upon the prosperity of which the comfort and well-being of workmen depend.

THE CHARM OF CO-PARTNERSHIP.

In the system of co-partnership which we have adopted and fostered now for a few years, we have the germ of a settlement which will be universally applicable. I have never said that the scheme of co-partnership is a perfect one; but it is the most perfect of which we know to-day. So long as we do not know a better, I hope we shall be of one mind in sticking to it. As I have more than once said, one of the charms attaching to the system to my mind is the way in which it draws us all together by means of our Committees. I am a strong believer in meeting face to face. It is, of course, impossible for the Chairman of the Company, the Directors of the Company, or the General Manager of the Company to meet everybody who feels he has a grievance. But these Committees at the works and at the different stations have provided means whereby everybody may talk over what he thinks may be improved, what he thinks is objectionable, and I am certain they also provide, by reference to the Board in cases of necessity, the means of rectifying any reasonable dispute. [Hear, hear.]

THE COMMON BOND.

I promised you I would not inflict upon you a speech; but it so happens whenever I get on my feet to talk to you—though I feel all the brightness of the occasion—I get into a solemn, serious, sermonizing vein, which I beg of you to excuse. ["Go on, Sir."] We welcome you most cordially here to-day. We cannot hope that, with a great companionship like this, we can have many opportunities of meeting in festive dress as to-day—at any rate, we cannot look forward to another centenary festival. [Laughter.] We may be sure of that. But I hope we shall have many opportunities of meeting together; and whenever we do so, we shall find the bond which has tied us together during, at any rate, the last ten years, and which has been growing in strength, will have grown stronger and yet stronger. When we go away from here to-day to face the work of to-morrow, we shall I hope be cheered through dull days which come to all by the knowledge that we are not alone, friends feel for and with us willing to help to bear sorrow as to share in this day of thanksgiving. ["Hurrah."]

RECOGNITION BY THE EMPLOYEES.

Mr. J. H. MILLS (a Beckton employee) said: Gentlemen, on some occasions it is rather a hard task for anyone to move a resolution in the shape of a vote of thanks. Some speakers have a very unhappy knack of rubbing people up the wrong way; but those who know our Governor are aware that he does not know how to rub people up the wrong way. Whenever we have the pleasure of listening to him, we have always felt we have learnt something; and I think the speech he has delivered to us this afternoon has been not only interesting but very instructive. He has taken us back 100 years not only in the history of the Company, but also in the history of our nation. Things that he has said this afternoon are quite new to some of us. Perhaps the most interesting part of his address was that connected with our Company. I say "our" Company, because we are all met here as co-partners; and he has told us some interesting events associated with our Company since its formation. We hear people talk about "the good old times." Well, happily we do not live in those so-called "good old times"—times in which labour was remunerated in the shocking manner of which we have heard, and when men, women, and children were treated not as human beings, but almost as animals. To-day we have an altogether better state of things. I for one feel glad I do not live in the "good old times," and that I live in the times of to-day, which I say are *the* good times, especially in connection with our Company. I think we have to thank most of all the Governor for the position in which we are to-day. The proprietors of the Company, in their wisdom, thought fit to choose Mr. Corbet Woodall as Governor. They, with us, to-day have no cause to regret the choice they made. One very important thing the Governor said was this, that he liked to meet the employees face to face. If the employers in certain parts of the country had shown this spirit during the last few weeks, the country to-day would not have been in the state in which it is. Because of Mr. Woodall's kindly and brotherly feeling, we realize the idea of a common bond. We all feel that Mr. Woodall thoroughly understands every one of us. The way in which he always meets us seems to touch our hearts directly: and I think the reception he has had this afternoon shows that we employees have great faith in what he says, because we find that all the promises he has made have been fulfilled. I am sure you will all agree with me that we cannot give too hearty thanks to Mr. Woodall and the Directors for the kind manner in which they have treated us, more especially during the last few years. Referring to this day, it is one that will ever be remembered by everyone who has taken part in it. This commemoration festival is a big undertaking. It may not appear so to some people who have not looked into it. But considering the number of people who have been brought here, and who have taken part in this centenary festival, it has been a gigantic undertaking. We at this meeting are the representatives of the employees; and we feel we owe a lot not only to Mr. Woodall, but to the other Directors, our "G. M.," the Secretary, the Chief Engineer, and the officers and staff right through from Westminster to the smallest station. They have all done their duty in connection with this day, and in a splendid manner [cheers]; and I am sure they will feel amply repaid (they are that sort of people you know) by seeing so many pleasant faces, and by the glad manner in which you have received them this afternoon. I will now move—"That the best thanks of the representatives of the employees at this meeting be given to Mr. Woodall, our Directors, the 'G. M.,' and all the officials for the kind manner in which they have received us this afternoon, and for all the benefits we have had at their hands, especially during the past few years." I may add in your name the earnest hope that our Governor will be spared to us for many years yet [hear, hear,] to direct, in conjunction with his colleagues, the affairs of this great Company.

GOOD TIMES PRESENT; BAD TIMES PAST.

Mr. W. WHEELER (a Westminster employee): Gentlemen, it affords me the greatest possible pleasure to second the vote of thanks. All of us, from our hearts, tender to the Governor and the Board of Directors our thanks for the great consideration they have shown us during the past few years. When I remember the condition of things as they existed nearly fifty years ago, and compare them with things as they exist to-day, I am confident we are living in the good times; and that the bad times are of the past. The point I specially wish to call your attention to is the change that has come over the Company's business in connection with the establishment of co-partnership. Co-partnership embraces the ethical side in the relations as between capital and labour; and it deals fairly with the ethical side. While I agree with our worthy Governor that co-partnership will not be the remedy for all industrial trouble, still it is a step in the right direction. That this is being more and more recognized has been seen by the debate on co-partnership which took place recently in the House of Commons; and an interesting debate it was. In addition, there has been a Bill introduced into the House, by which it is proposed to facilitate the introduction of co-partnership. Whether or not it bears fruit in the near future, it is anyway a step in the right direction. It shows the way we are travelling. I do not wish to overlook the fact that we owe a great deal of this to those who have gone before. It is largely due to them we are living under the present good conditions; and it is for us who are enjoying the more humane conditions of the present to assist, by our co-operation, in their advancement in the future. I am satisfied that, in the industrial system of to-day, we are all dependent one upon the other. We are as much dependent upon our Company's Directors and shareholders, as they are upon us in properly carrying out our duties. That is a very important fact for us to remember. However fit, too, we may be for our posts to-day, we have also to remember that as time passes we have to be more fit than we have been. To obtain higher positions in the Gaslight and Coke Company in the future, it will be necessary to have a higher level of fitness than to-day. I would ask the young men to recollect this. Only recently we were all sorry to hear that our worthy Governor was not in a good state of health; and I heard that sorrow expressed by men who could hardly have heard your name, Sir. And I also heard how glad they were when they had news of your recovery. [Cheers.] One word more. I would not like this meeting to pass by, Sir, without some reference to those who have gone

STRENUOUS RIVALRY BETWEEN WORKS AND WORKS.

[On the Football Ground at the Crystal Palace on Saturday.]

before. Within my recollection, several gentlemen who have occupied important positions in the Company have gone to their rest. Blessed be their memory. In connection with co-partnership, there is one name especially that I should like to mention. It is that of Sir George Livesey. Just as the name of Sir George Livesey was honourably associated with the work of co-partnership in the gas industry in the Nineteenth Century, so will that of our worthy Governor, upon whom the mantle of Sir George Livesey has fallen, be associated with that of the Twentieth Century. In conclusion, I would ask you to be upstanding, and give three hearty cheers to the Governor, the Directors, the headquarters officers, and the station staffs.

Three times three were the "Hurrahs" given by the vast meeting of representatives of the employees; and when the Governor got upon his feet to respond, the men had their own way, and heartily sang, "For he's a jolly good fellow."

Encouragement and Acknowledgment.

The Governor (when he could obtain a hearing) said: We are all, my colleagues, myself, and the officers, deeply indebted to the two co-partners who respectively proposed and seconded this resolution, and to you all for the remarkable way in which you have received it. If anything could encourage one and all to go on and try to do as well as we are doing, and a little better, it is the manner in which you have received this proposition. Mr. Mills has anticipated me in regard to the headquarters staff. I wanted, in the most cordial way possible, to acknowledge their work for this day, and especially that of our General Manager (Mr. Watson). I do not say he has neglected his other duties; but during the last fortnight, if I wanted to talk to him about anything at all, I was quite sure that, in the course of a minute or two, he would come round by some means to this day of days. [Laughter and cheers.] He and all who have been occupied with it, the Directors thank, and I I am sure you will thank, for the remarkable success which has attended it. It is impossible to say too much about the work that was required in order to organize this gathering. Let me say one word more. I want to apologize to your wives, or if you have not wives your potential wives [laughter], for having kept you away from them so long. I am sure they will not grudge it, because they are as greatly interested in the prosperity of the Company and in the happy relations between all classes in it, as you and we are. One finds it impossible now to forget that this is *our* Company in the most literal sense (we are all proprietors in it) and that your wives and children are as interested as you are in its prosperity. I wish you a very happy conclusion to this great day; and I thank you cordially for the way in which you have received your Directors and officers.

With another cheer, the audience separated, to proceed with their enjoyment of entertainment, sports, and the beauties of the grounds.

Sports, Tea, and Home.

While the meeting was being held, athletic displays by the Company's men were proceeding, before large audiences, filling the stands surrounding the football ground. As one left the meeting-room, wherever one turned the centenary medal and the coloured lettered badges of the men were to be seen. Walking through the Palace they were there; walking through the North Tower gardens, they were there; walking along the upper terraces and the lower part of the grounds, they were there; resting on the seats in the grounds, one's neighbour proudly displayed his medal. Going round to the side shows, the largest patrons of the day were the men wearing medals and the ladies with them. They were found in the Fairy Archipelago, in the Aquarium, and even the Monkey House, boating on the lakes, risking the sharp curvatures of the switchback railway, in the maze, on the coaster, on the joy-wheels, in the flying-machine, watching the grand spectacle of China and China Town—in short, there was no escaping the man with the centenary medal. Tea was served to the huge parties wearing the different coloured badges at the eight dining centres at 4, 5, and 6 p.m. At 6 o'clock, there was a gymkhana on the football ground. We ought to mention here that for the day's sports there were no less than 778 entries from the different stations, and each candidate paid 3d. entrance fee, for no other purpose than to co-operatively raise a little subscription for the Children's Fresh Air Fund. Co-partnership thus breeds and encourages the spirit of fraternal interest, and a place in the heart for those in a less fortunate position than oneself. We sat and watched the sports from beginning to end, enjoying the competence of these gas athletes, admiring the rivalry of the works and departments one against the other, growing enthusiastic over the rivalries of the cheering men, and the spurring-on remarks that were hurled at the competitors from all parts in race, tug-of-war, or other feats of skill. The triumphs of the candidates were the triumphs of their works.

An ending comes to all such occasions. With the fading light, came the end of the gymkhana. Then into the enclosure of the grand stand came Mr. D. Milne Watson, with the Chief Engineer, the Secretary, the Controller of Gas Sales, and other officers, for the purpose of presenting the prizes to the successful competitors and teams. Around the enclosure was an immense gathering, who cheered heartily as Mr. Watson handed the beautiful and serviceable prizes, and gave a hearty shake of the hand, to the winners individually. Everyone was pleased. Before parting, Mr. Watson congratulated the candidates on the success of the sports, and particularly the winners; and he awarded full praise to the Committee and all who had taken part in the organization of the sports, especially mentioning the Joint Hon. Secretaries (Mr. L. G. Field and Mr. W. J. Pepper).

Then there were cheers and musical honours for Mr. Watson and Mr. Goulden; and soon after the special and ordinary trains from the Palace began to carry their heavy human freights to different parts of London—to the points nearest their homes, where the events of the day (a day unprecedented in the century's history of the Gaslight and Coke Company) were doubtless much talked over, as they will be for many a day to come.

The success of the day was largely attributable to the excellence of the generalship, and to the whole-hearted manner in which officers from the highest to the lowest worked to make it what it was. This is true of them all; and in the forefront we see the General Manager (Mr. D. Milne Watson), the Chief Engineer (Mr. Thomas Goulden), the Secretary (Mr. H. Rayner), and the Controller of Gas Sales (Mr. F. W. Goodenough), to whom the members of the Press on Saturday were much indebted for his personal attention to their comfort and easy acquisition of information.

Several times in the course of the day, instrumental performances were given by the Band of the 12th Battalion County of London Regiment ("The Rangers," Beckton Band), the Company's Prize Band (Kilburn Branch), the Company's Stratford Military Band, and the Company's Nine Elms Military Band. The three last-named bands were massed for performing on the football ground during the gymkhana.

[For the photographs accompanying this report, we are indebted to the "Daily Graphic."]

Mr. J. F. Davies, who has for some time been Sales Manager to Messrs. John Wright and Co., has been appointed General Manager of the Company.

Mr. F. Niven, of Luton, has been appointed, out of 56 applicants, Manager of the Wells-next-the-Sea Gas-Works, in succession to Mr. A. Lusted, who has gone to Fakenham.

ELECTRICITY SUPPLY MEMORANDA.

Misleading Cost Comparisons—Suppressing Essential Facts—Electric Supply Publicity Committee's Literature—Cross Purposes—Wanted, Explanation and Confirmation.

When our electrical contemporaries are supplied with figures showing that an electric account has worked out to a lower figure than an account paid for gas, they never on any consideration stop to inquire whether the conditions are comparable; and the result is the publication of dishonourable comparisons. It matters not to them whether flat-flame gas-burners or original vertical incandescent burners are the things with which comparison is made; they care little or nothing whether the lighting power of modern gas-burners and of metallic filament lamps has any correspondence; they are heedless as to whether the hours of use are the same; it does not trouble their consciences the slightest whether or not the gas-burners are used during winter months for heating purposes as well as for lighting; and if two or three gas-fires or a cooker have or has gone to swell the sum paid for gas—well, they salve their consciences with the thought that it is not for them to point this out in justice to the competitor. We accuse "Meteor" of the "Electrical Times" of unfairness in these respects. The Distribution Superintendent of the Croydon Gas Company (Mr. W. J. Sandeman) recently issued a circular-letter, in which he made the following statement:

Taking 1000 hours as a basis, and omitting all question of renewals, which in the case of electricity are very much more costly than with gas, the comparative figures are as under:—

Electricity.	Gas.
One 50-candle power Osram lamp.	One 60-candle power inverted incandescent gas-burner.
Efficiency: 1·1 watts per candle.	*Efficiency:* 20 candles per cubic foot.
50 c.p. × 1·1 watts × 1000 hours = 55 units at 5d., £1 2s. 11d.	3 cubic feet × 1000 hours = 3000 cubic feet at 2s. 5d., 7s. 3d.

What is there to complain about in these figures? We cannot see anything in relation to the efficiencies quoted to which "Meteor" can take exception. As a matter of fact, we know from tests and experience that Mr. Sandeman in his computation has been lenient towards electricity; and this can easily be demonstrated by measurement. "Meteor" knows it, and is ingenious enough to keep himself aloof from any demonstration the results of which would be rather troublesome, or (we will put it stronger) quite impossible for him to explain away. "Meteor's" comment on the comparison is this:

We should not dream of questioning a statement of comparative costs made by so unbiassed an authority as a gas company. But we should like to know how to reconcile it with the following *actual* experiences of Croydon churches:—

1.—St. Peter's.

		£	s.	d.
Electricity .	One year's lighting (metal filament lamps)	13	0	4
Gas . . .	Do. (upright mantles) . .	26	2	6

2.—Christ Church.

		£	s.	d.
Electricity .	One year's lighting (metal filament lamps)	14	14	11
Gas . . .	Do. (mixed burners) . .	22	9	0

3.—St. Mark's.

Comparative figures not available. Upright mantles *v.* metal filament lamps. Churchwarden's statement at vestry meeting: "They had used the electric light more freely than gas, and had shown a saving of 25 per cent.

The relative prices were 4d. per unit and 2s. 7d. per 1000 cubic feet. Clearly there is some discrepancy between "true costs" and actual costs. As "true costs" are the child of calculation, and actual costs are what one has to write a cheque for, we fancy that consumers will be inclined to attach more importance to the latter.

We must dismiss St. Mark's Church, as that is not in the district of the Croydon Gas Company; but investigation has been made of the other cases. We take St. Peter's Church first; and in this instance there is a suppression by "Meteor" or by his informant of very material facts, which suppression (if wittingly done) is not honourable on the part of the one or the other. With regard to the amount of the gas account, we should, in the first place, like to know to which year the sum of £26 2s. 6d. refers, as the accounts for this church, as taken from the books of the Gas Company for the past twelve years, are as follows:

1900	£22	0	3	1906	£33	8	0
1901	17	11	5	1907	16	1	10
1902	17	15	3	1908	4	9	7
1903	17	17	5	1909	3	17	11
1904	21	9	4	1910	4	9	2
1905	22	13	11	1911	4	3	9

These are the actual payments; and there is no such figure as the one mentioned by "Meteor" for any single twelvemonth. Concerning the lighting, the electric light was installed in 1907; and for about three years previously, the Company had been endeavouring to persuade the churchwardens to permit them to refit the church on modern lines. The old lighting was of the primitive incandescent kind—"C" bye-pass burners; and these were fitted on the standards formerly used for the flat-flame burners. The system was most unsatisfactory; and the lights were badly located. The Company were not, however, allowed to show the effect of a modern equipment. Even now they would be prepared to guarantee for a similar number of hours lighting a far greater illumination than can be obtained by the metallic filament lamps, and at less cost. Apart from the character of burner, the question of the hours of lighting is also important, as frequently in the days of gas lighting the burners were lit up some considerable time before the services commenced, in order to assist in the warming of the church. Beyond the ignoring of this fact, no mention is made by "Meteor" of the also not unimportant point that the gas accounts included the gas consumed by two heating-stoves. Now what excuse has "Meteor" to make for himself or his informant for this suppression of material facts?

Take Christ Church next, "Meteor" mentions that in this instance the gas-burners were "mixed." That is true. There again, the vicar had been repeatedly approached regarding the improvement of the lighting of the church. But he had a personal preference for electric lighting; so that nothing could be done to show him what could be effected in the illumination of the building by modern gas-burners. But the point upon which we should like information is as to who supplied "Meteor" with the figure of £22 9s. as the sum paid for gas in any one year for Christ Church? Looking back in the Company's ledgers for the past eleven years, it is seen that the largest amount paid for gas in any one year by the church was £15 12s. 1d. That was in 1903—some nine years ago. Will "Meteor" do the right thing, and tell his readers he has been misinformed, and has had insufficient facts put before him; or will he acknowledge that he himself has suppressed essential facts bearing upon the conditions of the cases, and which suppression covers the electrical comparisons with a falsity that is not creditable.

A fresh sample batch of electrical literature of the leaflet and booklet form has recently been sent round to electricity station managers by the Electric Supply Publicity Committee. It is not a very attractive batch. There are little blotters of a size about sufficient to cover a "court" shape envelope, with an uninteresting picture on the non-active side of the blotter. There is something about electric vacuum cleaners among the circulars; and there is the inevitable anonymous comparison as to the cost of gas and electric driven machinery. There is the old-fashioned statement as to field-like space being required by a gas-engine, while a few square inches of a book-shelf or something of the kind will suffice for an electric-motor. There is the ordinary story as to the shafting and belting required by gas-engines, to which shafting and belting there is another tale when one wants to get down electric power costs in a works with the machines hitherto run by isolated electric-motors. Electric lighting is also said to be a necessity for safety in factories, in view of the inflammable particles constantly floating about in the atmosphere; and this is said despite the statement in one part of the recent report under the Factories and Workshops Act that the electric light will not properly penetrate the dust, fumes, and vapour present in some workshops. There is the ordinary poor little circular about electric-fans, which circular starts by saying that "in every home a supply of fresh, pure air is absolutely necessary to health," and assures the reader that, by an electric-fan, "the air in a room can be completely changed every few minutes, and this constant renewal of the air can be effected without draughts." Nothing is said about all these blessings of the electric-fan having to be dispensed with when electric-radiators are in use for warming, as a change of air every few minutes would complete the verdict against them as heating agents.

Among the batch of leaflets, we come across a little pamphlet by Mrs. W. T. A. Cross on "Electric Cooking;" and it consists of half-a-dozen miniature lectures. The title "miniature" is good; for there is much small talk in them, and really nothing of a very serious character to review or criticize. We rather fancy from the identity of statement that Mrs. W. T. A. Cross is the Amy Cross who contributed to the Electric Supplement in "Country Life" in March. If this is so, there is perhaps a little more reason for putting a few inquiries to this lady who has taken the wrong turning in this matter of cooking. She is a First-Class Diplomée of the National Training School of Cookery; and therefore for honour sake she cannot refuse us the pleasure of a little discussion on certain points of mutual interest. We believe that Mrs. Cross at one time carried on her cookery work with gas-ovens—in fact, she did so for several years, without any complaint; no doubt praising their convenience and other excellent characteristics, and without being killed by their "poison." At any rate, we know that she is still in the land of the living, or was until recently, as she was seen animate, courteous, and——talking. She has, however, turned completely on the gas-oven that did so much to enable her to follow her avocation before she was taken up by the electrical people, or before she took them up—it does not matter much which. It is observed that both in the pamphlet and in the article in "Country Life," Mrs. Cross speaks of "gas fumes;" and she does this to attempt to disparage the gas-oven, by trying to induce people to believe that the "gas fumes" are noxious to their health. She also characterizes the fumes as poisonous. As Mrs. Cross is a First-Class Diplomée of the National School of Cookery, she will favour us by telling us more about these fumes. We should like her to put their proper names to them; tell us in what way they are "poisonous;" and inform us why she is still alive after her long experience at inhaling them. We know, by-the-by,

of two or three gas companies who are on the look-out for cases of gas consumers whose custom is diverted from them by this "poisonous fumes" trade slander of gas; and the authors of the slanders will, if such consumers be found, hear something very much to their future ethical advantage. However, Mrs. Cross will undoubtedly supply us with the information for which we ask as a preliminary to further discussion.

Then we see that the same lady asserts that "soot does come away from a gas-stove;" and her intelligence suggests that confirmation is found "on the ceiling above a gas-burner used for lighting purposes." This is interesting. Will Mrs. Cross tell us whether she has ever analytically examined the darkened patch over the old-fashioned form of gas-burner? If so, what has been the result? Then about the "soot" from a bunsen gas-flame. Let us take a free-burning, properly ordered atmospheric gas-flame as gas-oven jets should be; and will Mrs. Cross tell us how the soot is formed with the complete combustion of the gas and air mixture? Then we are in a bit of a quandary about an incident that Mrs. Cross relates. She says that "some years ago," she was demonstrating to a class of children with the aid of our friend the gas-stove. "Some workmen employed just outside the room turned the gas off at the main, and then turned it on again, without saying anything to me about it; and, when I opened the oven, there was a small explosion, and flames rushed out." The narrative is lacking in almost everything but ambiguity. In the first place, why did not Mrs. Cross's nasal organ detect the smell of the escaping gas? In the second place, how could the gas have been turned off without extinguishing the gas-jets? Thirdly, how could there have been a small explosion, and flames rushing out, by the mere act of opening the door, and without the application of a light. Next if Mrs. Cross knew that the gas was turned off, why did she not turn the gas-oven taps? There ought to be some considerable interest attaching to Mrs. Cross's reply as to how the gas became ignited. "Fortunately," she adds, "I had formed the habit of standing well back when opening the door of a gas-oven, so as to avoid the noxious fumes which always greet one." This of an old and at one time valued friend! We have been talking to ladies who have used gas-ovens for upwards of a quarter of a century; and they smile the smile contemptuous over Mrs. Cross's "noxious fumes" on opening an oven door. Friend "Meteor" of the "Electrical Times" will tell this lady that the air-blast conditions prevailing in the gas-oven will not allow "noxious fumes" to accumulate there, and to come tumbling out when the oven-door is opened. However, Mrs. Cross would have had our profoundest sympathy if we had known of this occurrence of "some years ago," which, as she specially relates it in this pamphlet, must have been the worst one she has ever encountered. It did not, however, prevent her using gas-ovens in the many years that separate the present from the year of long ago. There are points about cost, wastage, and other things in the pamphlet which we may have an opportunity of referring to on a future occasion. Meanwhile, Mrs. Cross will enlighten us on those points upon which we, with great sincerity, seek information from her large store of knowledge. It may fortify her in making reply if we direct attention to a few lines from an article by Mr. A. F. Harrison in the last-issued "Journal of the Electric Supply Publicity Committee." Dealing with the question of their circulars and pamphlets, he says: "Consistently worded, they are the *responsible* statements necessary to induce the cultivation of knowledge on subjects of vital importance, not only to the individual taste or the individual pocket, but equally to public and collective well-being." It is not necessary to try to understand exactly what Mr. Harrison means by all the words quoted, but we want Mrs. Cross to read the first seven words of the quotation—placing due emphasis on the word "responsible."

Bacterial Penetration in Slow Sand Filters.—In order to follow the biological changes taking place within the sand of the secondary filters at Albany (N.Y.), samples of sand representing definite depths were collected at many points in the bed by means of a special boring device. The results appear in the annual report of the Bureau of Water for the year ending Sept. 30, 1910, and are noticed in "Engineering Record." It is stated that 100 grammes of the sand were shaken in 100 cubic centimetres of distilled water for a minute on the sand-engine, and then diluted to 1 litre. The turbidity of the suspension was then read, and aliquot portions were used for the determination of the organic nitrogen and oxygen consumed. In this way, the penetration into the sand of silt, bacteria, and organic matter could be readily determined. Analyses of this nature tend to prevent subsurface clogging, as the condition below the sand surface is always known, and the limit of penetration definitely fixed. At Albany, it has become the practice to eject each scraping to an outside storage pile, and then replace the cleaned sand at definite intervals. From the sand analyses, made by the Chemist-in-Charge (Mr. G. E. Willcomb), it has been shown that most of the silt and bacteria penetrate to a limiting depth of 10 inches. Consequently, before any new sand is replaced the old 10-inch surface is completely renovated and washed by ejection and separation, and then the fresh sand is added on the top. Under such conditions, the resultant turbidity of the sand is kept below 800, the organic nitrogen below 0·35 part per 10,000 grammes of dry sand, and the oxygen required below 5·5 parts per 10,000 grammes of the dry sand employed. To all intents and purposes, this is a clean sand.

A JUBILEE AT READING.

YESTERDAY was a great day in the history of the Reading Gas Company; for there was then celebrated, in fitting manner, the jubilee of the undertaking as it now exists. Not the jubilee, of course, of the gas supply of Reading (for gas was introduced into the town as long ago as 1819), but of the amalgamation in 1862, by Act of Parliament, of the Reading Gaslight Company and the Reading Union Gas Company, and the incorporation of the present Reading Gas Company. One part of these jubilee celebrations consists of an excellently printed and illustrated "Retrospect," prepared by the Engineer to the Company, Mr. Douglas H. Helps, Assoc.M.Inst.C.E.; and, in further commemoration of the occasion, the employees' club and mess-room have been enlarged and redecorated, the stokers' mess-room has been rebuilt and improved, a bonus (in proportion to the length of service) has been granted to the Company's workmen, and the fifty years' chairmanship of Mr. J. Okey Taylor, J.P., has been signalized by the painting of his portrait in oils. Next week, we shall be giving some report as to yesterday's doings; but a few moments may now be devoted to Mr. Helps's "Retrospect."

Reference has been made to Mr. Okey Taylor's long connection with the Company; and it may be added that he joined the Board of the Reading Union Gas Company in 1855, and became Chairman in 1857. On the amalgamation, he was at once made Chairman of the new Company; and among the other Directors was Mr. H. Bilson Blandy, J.P., the present Vice-Chairman. At a meeting of the Directors of the Company in June, 1905, a presentation was made by his fellow Directors to Mr. Okey Taylor, in celebration of his fifty years' connection with the gas supply of Reading and of the eightieth anniversary of his birthday. Thus the Chairman is now 87 years of age; Mr. Blandy also being 85 years old. It is probably a unique circumstance in a gas company's history—and possibly in that of any company—that both the Chairman and Vice-Chairman are octogenarians. Much has appeared in the local Press from time to time with regard to Mr. Okey Taylor's long association with the public life of Reading; and he is described as the "Grand Old Veteran." He was Mayor of the town in 1862; and the most important event during his term of office was the presentation to the Prince and Princess of Wales (the late King Edward VII. and Queen Alexandra) of the first address of congratulation on the occasion of their marriage. The Vice-Chairman is also an Alderman and Freeman of the borough, in addition to being a Magistrate for the county. The value of the book under notice to its possessors will be much enhanced by the portraits it contains of these two greatly esteemed gentlemen.

The "Retrospect" begins at the beginning, with the birth of the gas industry; and the reader is soon brought to the date of the introduction of gas lighting into Reading, for the first Reading Gas Company was formed in 1819, only a very few years after the Gaslight and Coke Company in London. Gas was adopted in that year for lighting the principal streets of the town; but the funds at the disposal of the Commissioners only allowed of the lights being used for eight months out of the twelve. Three years after the amalgamation, Mr. Edward Baker was appointed Engineer and Manager, and the Company made steady progress. After a period of considerable extensions, the construction of the present works was commenced in 1881, to the designs of Mr. Baker; and in the spring of 1888 they were brought into use. In March, 1903, Mr. Helps was appointed Engineer and Manager; and very shortly afterwards it was found necessary, owing to the rapid increase in the consumption of gas, to augment the productive capacity of the works.

In addition to a number of photographs of the works, the "Retrospect" contains a table giving the coals carbonized, the gas sold, and the number of consumers from the year 1862 to 1911; and there is also a chart showing, over this period, the total capital employed and the gas made per annum. From these one can see at a glance the striking character of the Company's progress. Whereas the consumption of gas in 1865 amounted to only 47 million cubic feet, in 1911 it had risen to 614 millions—an increase of no less than 1206 per cent. In 1863, the coal used amounted to 5601 tons, while in 1911 50,971 tons were carbonized. The capital expended was in 1865 £47,568 (or £8 9s. 10d. per ton of coal carbonized), as compared with £311,323 (or £6 2s. 1d. per ton) in 1911. Then in 1865 the charge made for gas was 5s. per 1000 cubic feet, which compares with 2s. 4d. (and no meter-rental) at the present time. The earliest record of the number of consumers is for the year 1881, when there were 2883. Now the number is 17,285. An interesting point to note in this connection is that, while from 1881 to 1901 the increase in the number of consumers was from 2883 to 5283, the growth between 1901 and 1911 was from 5283 to 17,285. To supply these customers 108 miles of main have been laid. The Company have 13,487 cooking-stoves and 2628 gas-fires on hire; and there are, of course, many others in use which have been purchased by consumers.

Having dealt so well with the past times, Mr. Helps concludes his "Retrospect" with some remarks on the future of the gas industry—showing the unassailable position that gas holds as the cheapest of all artificial lights. One closing quotation from this portion of the book may be given. It is as follows: "Medical statistics reveal the fact that the health of our nation as a whole was never better than at the present time; and if we turn to the Board of Trade returns we find that the consumption of gas in the British Isles has doubled in the past twenty years. Now an old

adage has it that 'Where the sunshine never goes, the doctor does.' May it not be claimed, notwithstanding the partisan statements which appear from time to time as to the terrible effects produced by gas lighting, that the cheering effects of its excellent light have played no insignificant part in improving the health of the nation?"

NATIONAL INSURANCE ACT AND GAS WORKERS.

Report of the Joint Committee of the Gas Companies' Protection Association and the Institution of Gas Engineers.

It will probably be remembered that a few weeks ago a Joint Committee of the Gas Companies' Protection Association and the Institution of Gas Engineers was appointed to obtain decisions of the Umpire under the National Insurance Act, 1911, in regard to the applicability of Part II. of the Act to workmen employed in gas undertakings. The Committee consisted of Messrs. H. E. Jones, C. Carpenter, G. Clarry, E. Allen, and D. Milne Watson, representing the Association, and Messrs. R. G. Shadbolt, Alexander Wilson, Robert Watson, Samuel Glover, and John Bond, representing the Institution of Gas Engineers. The Committee have now made the following report.

The Committee have had several meetings, and finally appointed Mr. G. Clarry, of Cardiff, Mr. D. Milne Watson, of the Gaslight and Coke Company, London, and Mr. Alex. Wilson, of Glasgow, a Sub-Committee to attend the Umpire and the officials of the Board of Trade appointed under the Act for the purpose of putting the Gas Companies' case before the Umpire, and for obtaining further information.

The last-mentioned Sub-Committee, after meeting the Umpire and also the officials of the Board of Trade, and visiting the Nine Elms station of the Gaslight and Coke Company, for the purpose of inspecting a retort-bench at work, in company with two of the last mentioned officials, and taking into consideration the published decisions of the Umpire, report as follows:

While there are still some questions relating to the gas industry on which the Umpire has to give his final decision, and although other points may arise which will have to be referred to the Umpire, sufficient information has been obtained to enable the Sub-Committee to advise gas undertakings as to the probable work on which contributions will or will not have to be paid under Part II. of the Act.

Gas-Works.

The manufacture of gas not being one of the insured trades, the Sub-Committee are of opinion that all men wholly or mainly engaged in the actual manufacture of gas are free from the operation of Part II. of the Act. The men so employed include coalmen, stokers, firemen, ashmen, pipemen, barrowmen, cokemen, purifier men, boiler men, exhauster and engine men, pump men, stoking machine men, elevator and conveyor attendants, locomotive drivers and shunters, men loading coke—in fact, all workmen or attendants engaged in any of the operations of manufacture, from the receiving of the coal to the dispatch of the coke.

Further, draughtsmen, timekeepers, storemen, gatemen, watchmen, weighmen, office attendants, commissionaires, clerks, and typists engaged in the gas department, and all workmen wholly or mainly employed in shoeing horses or making or repairing stokers', firemen's, or other hand tools, will not come under Part II. of the Act.

Contributions are, however, payable for all workmen while they are wholly or mainly employed—

1.—In the construction, alteration, repair, decoration, or demolition of buildings.
2.—In the manufacture, erection, and repair of all engines, exhausters, pumps, stoking-machines, elevators, conveyors, &c.—in fact, all kinds of machinery.
3.—In the construction, repair, and decoration of all vehicles.
4.—In the construction, reconstruction, or alteration (but not repair) of all works of construction, such as retort-benches, gas-producers, flues, boiler-settings, chimneys, holders, purifiers, scrubbers (when not operated by machinery), condensers, mains, roads, railways, bridges, &c.

Note I.—The word "alteration" does not refer to work usually charged to revenue account.

Note II.—While the question of retort-benches and gas-producers being classed as "works of construction" is reserved, it is expected that they will be put into this class, and therefore that all workmen engaged in the ordinary repair, cleaning, resetting, and general upkeep of retort-settings or gas-producers will not come under Part II. of the Act.

Residual-Works.

Practically the same rules will apply to the chemical and residual works in connection with gas-works.

Distribution Department.

In the distribution department, contributions are not payable under Part II. of the Act for workmen wholly or mainly employed on—

1.—Gas-fittings—*i.e.*, gasaliers, brackets, &c.
2.—Removable gas-stoves.
3.—Repairing gas-meters or cocks or valves used in connection therewith.
4.—Laying or repairing branch or service pipes.
5.—Repairing or renewing gas-mains.
6.—Erecting or repairing lamps and lamp-posts used for street lighting purposes.

But contributions are payable for workmen wholly or mainly employed on—

1.—The laying or construction of gas-mains (other than services), the cost of which would usually be charged to capital account.
2.—The carcassing of "buildings" with gas-pipes.

Additional Decisions by the Umpire.

In the last number of the "Journal" (p. 35), we gave some of the decisions of the Umpire under the Unemployment Insurance Regulations in connection with the National Insurance Act. The following additional decisions are reproduced from the current issue of the "Board of Trade Journal."

The Umpire has decided that contributions are payable from the following:

Workmen employed by a firm of gas engineers, and engaged wholly or mainly in the work of—(1) fitting and turning parts of engineering steel work used in the manufacture of plant and machinery for gas-works; (2) construction and erection of plant and machinery appertaining to gas-works; (3) labourers engaged with the above; (4) gas-fitters engaged away from the works in the installation of gas-services in private and public buildings.

Gas plant labourers.

Workmen engaged in the work of building upon the site bridges, gasholders and tanks, and the preparation of the material therefor on the site or in a constructional yard or shop.

The Umpire has decided that contributions are not payable in respect of the following:

Workmen employed by a gas company, and engaged wholly or mainly in the work of (1) fuel handlers, unloading fuel; (2) elevator men, working automatic elevators; (3) feeding producer men, feeding producers, withdrawing, and wheeling away ashes; (4) washermen, scooping soot; (5) tower and tank men, attending to the towers and skimming tar; (6) blowermen, oiling and attending Roots blowers and pumps; (7) compressor men, oiling and attending compressors; (8) gas-engine men, attending gas-engines and electrical plant; (9) stokers; (10) meter testers; (11) inspectors and assistants, cleaning and distributing apparatus, inspecting and reading meters; (12) labourers, cleaning up, &c.; (13) sulphate of ammonia men; (14) packers of sulphate; (15) store and time keepers and assistants; (16) watchmen, cleaners, tarmen.

Workmen engaged in the work of cutting and fitting-up with connections flexible metallic tubing to be used, among other purposes, for parts of gas-pendants.

Workmen employed at gas-works, and engaged wholly or mainly in (1) drawing and charging gas-retorts and attending furnaces; (2) discharging coal from railway trucks, and labour generally; (3) inspecting and testing consumers' meters.

Workmen engaged in fitting-up and finishing ready for sale cast-iron gas cooking apparatus, coal and coke stoves, grates, and gas-stoves.

Gas-meter makers, including tin-plate workers and those engaged in fitting and turning the internal mechanism—*i.e.*, brass parts—used in the manufacture of these meters.

In the current number of the "Board of Trade Journal," it is notified that the decisions relating to workmen employed by a local authority (those contained in the last group on p. 35 of last week's "Journal") are applicable also to workmen employed by gas, electric supply, tramway, and water supply companies, contractors, or others, when engaged on work of the kinds mentioned in those decisions.

Peat for Producing Motive Power.

One of the Divisional Inspectors of Factories (Mr. J. Burns, of Belfast) gives in his report the following account of a large weaving factory in which peat is used for the production of gas for motive power: "Peat, originally containing 80 to 90 per cent. of moisture, is dried in the open till it contains only 25 per cent., when the blocks are placed in a feeding-hopper from which they pass to the generator, where gasification of the fuel takes place by partial combustion, and crude gas results, quite as rich as that obtained from anthracite coal. The gas is then driven off, cooled, purified, the bye-products removed, and the clean gas passed into a gas-holder ready to supply the engine. It has been found that peat gas giving over 16 brake-horse-power is obtained at a cost for fuel of only 1d. per hour. The peat costs 6s. a ton as compared with 32s. for coal; two tons of peat going as far as one ton of coal."

During the three months ended June 30, the Road Board, with the approval of the Treasury, made advances amounting to £123,315 from the Road Improvement Fund to county councils and other highway authorities. Of the above-named sum, £105,186 was for the improvement of road crusts, including grants towards tar macadam, &c., and surface tarring; the total grant for this purpose to the end of last month having been £525,980.

EXAMINATIONS IN "GAS ENGINEERING."

How the Subject is Dealt with at the Manchester School of Technology.

THE discussion which took place at the recent meeting of the Institution of Gas Engineers, on examinations in "Gas Engineering" and "Gas Supply," led our Manchester Correspondent to make some inquiries as to the methods adopted at the local Municipal School of Technology. To bring out the engineering side of the subject, special lectures are given there by Mr. C. E. Teasdale (Salford); while on the chemistry side Mr. F. S. Sinnatt takes the Advanced Grade and Mr. W. Buckley the Ordinary Grade. This division of the subject has been found to have had a decided effect in improving the efficiency of students, as evidenced by the results of the examinations. In the opinion of Mr. Teasdale, the lectures from the engineering side are a necessity, if the subject is to be treated properly; and such lectures, he adds, should be delivered by an engineer. If the engineering portion were attempted by the chemist, there would be the danger of falling into the groove which Mr. Thomas Glover pointed out in the course of his paper at the meeting referred to—viz., that while the chemistry side was perfectly satisfactory, as shown in the examinations of students, the engineering part was evidently neglected. Mr. Teasdale also holds that the subject of "Gas Engineering" should be divided into two distinct examinations—*i.e.*, (1) "Gas Chemistry," including manufacturing; and (2) "Gas Engineering." At the Manchester School of Technology, this is already done, as will be seen from the papers set at the last examinations, of which the following is a copy.

CHEMISTRY SECTION.

1. What percentage of nitrogen is present in bituminous coal? Show how the compounds which contain nitrogen are distributed in the products of carbonization.

2. Describe a process by means of which coal gas may be purified by using the ammonia present in the gas.

Or Explain any process which has been used for the complete elimination of organic sulphur compounds from gas.

3. Without going into details of the plant, discuss the relative merits of the vertical retorts and horizontal retorts with respect to the following points: (*a*) Commercial value of the gas, (*b*) residuals, (*c*) labour, (*d*) for small works.

4. In what different ways is the heat generated in a setting of retorts expended? Which portions may be considered as waste heat?

5. What values obtained by the analysis of coal are of the greatest importance in ascertaining the suitability of a coal for gas-making purposes?

GAS ENGINEERING SECTION.

1. State the chief points to be considered in the selection of a site for new gas-works; also the chief points in the subsequent planning-out of the works. Sketch a part elevation and section of the retort-house walls, showing how economy can be effected in the brickwork without materially altering the strength, and at the same time giving simple ornamentation to the whole structure.

2. In the design of a horizontal regenerator retort-setting, what are the methods adopted for ensuring (*a*) equal heating of retorts, (*b*) efficient supporting of retorts, (*c*) efficient protection of retorts, (*d*) efficient working of the setting?

3. Explain how the hydraulic main resembles the ordinary pressure-gauge, and how the rise and fall of the liquid is affected by the area of dip-pipes and main respectively. A hydraulic main is 24 inches wide by 10 ft. 6 in. long (inside dimensions), containing eight 6-inch diameter dip-pipes of $\frac{1}{4}$ inch thick metal, and having a seal of 1 inch. Assuming the main is at rest, no retort-house governor is used. Calculate, in the event of the exhauster stopping, (*a*) the amount of back-pressure that would unseal the dip-pipes; (*b*) the safe working seal, the maximum back-pressure being 20 inches. Area of 6-inch diameter circle = 28·27 square inches; area of 7-inch diameter circle = 38·47 square inches.

4. Describe, with the aid of sketches, the Koppers or Munich chamber setting. What are the advantages of such settings?

5. It is intended to erect a new gas-works capable of producing $1\frac{1}{2}$ million cubic feet of gas daily. State the superficial area of condensing surface, cubical contents of scrubbers, number and size of purifiers, and number and capacity of gasholders you would suggest. Describe, with sketches, any form of centrifugal washer.

6. A purifier is 30 feet square by 5 feet deep, and has a water-lute 30 inches deep by 8 inches wide. Calculate the maximum lifting force that can act on the cover. This is secured to the body of the purifier. What are the resisting forces to this upward pressure? In the event of the upward pressure being greater than the resisting forces, how would the difference be overcome?

7 (*a*). The present gas storage capacity of a works is under the recognized standard. Discuss various schemes for ensuring a supply of gas during a period of maximum demand—say foggy weather. Which is the best scheme?

Or (*b*) In a telescopic holder of four lifts, when fully inflated, the inner lift works free of the guide-framing. What are the forces which prevent it tippling over—say during a gale? Describe and sketch a method of adjusting the carriages of a holder.

8 (*a*). A gas-engine has been used in conjunction with a suction-gas plant, and developed 20 B.H.P. on full load. It is proposed to use the engine on town gas. How would you ascertain whether the engine is suitable for this purpose, and what brake-horse-power would you expect to obtain under the new conditions? The calorific value of the town gas is 580 B.Th.U.

Or (*b*) On the diagram are given reproductions of indicator cards from a gas-engine. Criticize them, and state what are the causes of the various defects. [The diagram is on the paper.] It is desired to examine the suction and exhaust strokes. How would you arrange to obtain a diagram to show this to a sufficiently large scale?

NOTES ON POLLUTION OF GAS IN HOLDERS BY SULPHURETTED HYDROGEN.

By J. G. TAPLAY.

THE paper read by M. Guillet before the Société Technique du Gaz en France, on "Pollution of Gas in Holders and the Removal of Carbon Bisulphide," a translation of which was published in the "JOURNAL" for the 25th ult. (p. 986), is of considerable interest; and the writer of these "Notes" is pleased that his own experiments on the "Formation of Sulphuretted Hydrogen in Iron Service-Pipes," published in the same number, have been corroborated in such a way.

There, are, perhaps, a few statements in M. Guillet's paper which call for comment. The following experiments, bearing on the above paper, were made. In each case a flask of about 250 c.c. capacity was employed. The neck of each flask was fitted with a cork carrying inlet and outlet tubes of glass; the whole being made gas-tight by means of melted sealing-wax. The contents of the flasks were sealed by drawing out the glass tubes in a gas-flame. Approximately the same weight of water—viz., 25 grammes—was used in each flask; 25 grammes of metal were used in those flasks containing metal; and where liquid carbon bisulphide was employed each flask contained a similar amount, which was allowed to sink underneath the water until the flask containing it was sealed. In the neck of each flask a piece of acetate of lead test-paper was suspended.

The flasks are described as follows:—

Flask (*a*) contained cast-iron borings and distilled water. The air in the flask was displaced by carbon dioxide, after which the whole was sealed.

Result.—In one hour after sealing there was a slight stain on the test-paper, due to sulphuretted hydrogen. This stain had increased considerably in twelve hours, and sulphide of iron and, later on, iron rust had formed.

Flask (*b*) contained wrought-iron turnings and distilled water. The air was displaced by carbon dioxide.

Result.—In about twelve hours after sealing there was a slight stain on the test-paper, due to sulphuretted hydrogen, which increased later on. Sulphide of iron and iron rust formed.

Flask (*c*) contained pure iron, in fine powder, and distilled water. The air was displaced by carbon dioxide.

Result.—No stain shown on the test-paper. No sulphide of iron and no iron rust formed, though the flask had been sealed for more than a week.

Flask (*d*) contained a polished wrought-iron rod and distilled water. The air was displaced by carbon dioxide.

Result.—No stain shown on the test-paper. No sulphide of iron was formed after the flask had been sealed for a week; but iron rust was formed.

Flask (*e*) contained a polished cast-iron rod and distilled water. The air was displaced by carbon dioxide.

Result.—A stain, due to sulphuretted hydrogen, was shown on the test-paper in about 48 hours. The stain increased, and in another day or so iron rust formed.

Flask (*f*) contained cast-iron borings and distilled water. The air was displaced by hydrogen.

Result.—No stain was shown on the test-paper. No sulphide of iron was formed after the flask had been sealed for a week, but a little iron rust was formed.

Flask (*g*) contained cast-iron borings, distilled water, and a few drops of carbon bisulphide. The air was displaced by hydrogen.

Result.—A stain, due to sulphuretted hydrogen, was shown in a few minutes. This stain rapidly increased, and in 24 hours the test-paper was quite black with a metallic lustre. Sulphide of iron was also formed and iron rust a day later.

Flask (*h*) contained a polished wrought-iron rod, distilled water, and a few drops of carbon bisulphide. The air was displaced by hydrogen.

Result.—A very slight stain, due to sulphuretted hydrogen, was shown on the test-paper in three hours; and in 24 hours a pale, brown stain appeared over the whole surface of the paper. The polished metal became covered with a coating of iron sulphide. Later on, the test-paper became quite black with a metallic lustre, and iron rust was formed.

Flask (*i*) contained pure iron in fine powder, distilled water, and a few drops of carbon bisulphide. The air was displaced by hydrogen.

Result.—A slight stain, due to sulphuretted hydrogen, was shown in three hours. In a day or so later the test-paper became black with a metallic lustre, and sulphide of iron was formed. Iron rust was not formed.

Flask (*j*) contained wrought-iron turnings, distilled water, and a few drops of carbon bisulphide; the air was displaced by hydrogen.

Result.—A stain, due to sulphuretted hydrogen, was shown in about one hour; and in 24 hours a black stain, having a metallic lustre, appeared over the whole surface of the test-paper. This was the heaviest stain on any of the test-papers. Sulphide of iron was formed, and in a day or two, iron rust also.

Flask (*k*) contained water and a few drops of carbon bisulphide. The air was displaced by hydrogen.

Result.—A pale stain, due to sulphuretted hydrogen, was shown on the test-paper in 24 hours. In four days this stain became dark brown. [This is the repetition of a similar test made during October, 1905.]

These experiments (*a*) to (*k*) show that the sulphuretted hydrogen can be produced in the following ways:—

1.—By the action of a weak acid (carbon dioxide in water) on the metal, whereby the metallic sulphide itself is attacked. This does not appear to take place, however, if the surface of the metal has a high polish, as in flask (*d*).
2.—By the electrolytic decomposition of the water and formation of sulphuretted hydrogen from the carbon bisulphide present.
3.—By catalytic action, due to the metallic iron being in very fine division, as in flask (*i*).
4.—By the slow reaction of carbon bisulphide and water.

There is no doubt that cast iron or wrought iron, when in the form of borings or turnings, as the case may be, is more energetic than when either is in the form of a plate; and cast iron is more so than wrought iron when taking all the above points into consideration, though, from a purely electrolytic point of view, wrought iron would appear the more energetic, as in flask (*j*).

From the experiments made by M. Guillet, and here verified, it is very probable that the pollution of the gas in the holder referred to by him was caused in the manner described, inasmuch as the tank of the holder was constructed of wrought iron. It is not so certain that pollution will arise in this way if the tank is not built of iron. In the case of the pollution of gas by bacterial action in the tank waters, the tanks referred to by the writer in his article published last year are of brick and cement, the bell of the holder being, of course, of iron. The water contents of two gasholder tanks which were especially bad, are 4 millions of gallons each.

The sulphate of copper solution used was added to the tank water by way of a syphon-pipe in the centre of the crown of the holder, and not round the sides of the tank. This copper sulphate solution was not added with any idea other than to destroy the micro-organisms which were actually found in these waters, and which were actually proved (not assumed) to be the active cause of the pollution. That this pollution has ceased for a period of upwards of 6½ years since the copper sulphate treatment seems of itself to be ample proof that it was due to no other cause.

The inner sides of the wrought-iron plates composing the bell of some holders examined when out of action, have been found to be covered with a film of hardened oily and tarry matter, while the crown was covered with naphthalene. This is especially the case with holders storing a mixture of coal gas and carburetted water gas. Such plates are protected from any considerable electrolytic action; and apparently this is so with the holders referred to by the writer of these "Notes." This oily film would effectively prevent the copper sulphate being converted immediately into iron sulphate on contact with the plates of the tank, or in this case with the plates of the holder; and the chance effect due to the deposition of metallic copper, as was suggested by M. Guillet, would not take place.

M. Guillet states that the quantity of sulphuretted hydrogen formed by metallic iron, carbon bisulphide, and water, in intimate contact, is in all cases greater than that obtained through the agency of micro-organisms. He further says that in some English experiments the blackening of test-papers by hydrogen sulphide (produced by alleged biological means) was a matter of from one to three months; while in the case of the chemical processes the same result was obtained in less than an hour.

In the biological experiments made by the writer the question of carbon bisulphide did not enter at all. The pollution had to be reproduced by the specific bacilli acting on organic matter itself free from sulphur, and in the presence of an aqueous solution of calcium sulphate or magnesium sulphate. As a rule, sulphuretted hydrogen was indicated on the test-paper in from three to four days; but when once the indication started it progressed rapidly.

With regard to the holders themselves, the writer stated at the time that sulphuretted hydrogen was produced in such quantities as to contaminate daily the gas to such an extent that it blackened a test-paper in a few seconds; and here it may be remarked that these holders were emptied, or nearly so, and filled with fresh gas each day.

M. Guillet refers to a case recorded in the "JOURNAL," some time ago—Vol. LXXXVII., p. 734. The writer of these "Notes" must here take the opportunity of stating that he is not responsible for the record, as he did not write it; and, moreover, it differs in many respects from what was actually done.

With regard to the removal of carbon bisulphide from the gas by means of heated oxide of iron in the purifier-box, the writer may state that he made a large number of experiments on the elimination of this sulphur compound from coal gas during the years 1908 to 1910. One of the experiments consisted in passing the coal gas through "burnt" oxide contained on trays of iron-wire gauze fixed in a small vertical retort, heated to an average temperature of 326° C. (619° Fahr.).

The quantity of "burnt" oxide employed for the test was 0·5 lb. avoirdupois; and the total quantity of gas passed through it was 2000 cubic feet, at the rate of 4 cubic feet per hour. The average quantity of sulphur in the gas at the inlet to the apparatus was 40·5 grains per 100 cubic feet, and the average quantity at the outlet was 12·5 grains.

It may be remarked that analyses of the gas at the inlet and outlet of the apparatus showed that the hydrocarbons did not suffer in any way by passing through the heated oxide. The "burnt" oxide referred to is oxide left after removing the sulphur by burning in a kiln, for the manufacture of sulphuric acid.

UNIVERSITIES AND TECHNICAL EDUCATION.

Views of Professor Smithells.

THERE was opened in London last Tuesday the Congress of the Universities of the Empire, the delegates to which received a cordial welcome from Lord Rosebery, in the name of the University of London, of which he is the Chancellor. His Lordship delivered an address in which he insisted upon the significance, from an Imperial standpoint, of such a rallying of distinguished leaders of education as that witnessed at the Congress. He said the special need of the Empire was men of high character; and this it was pre-eminently the office of the Universities to supply. Among the papers read was one by Professor Smithells, of the University of Leeds, who dealt with the relation of the Universities to technical and professional education.

Professor Smithells described his paper as being, in the main, a plea for the whole-hearted acceptance by Universities of what are called technical and professional studies and for their embodiment in the University system on equal terms with other subjects. He understands the word "professions" in the title of his subject to refer to callings such as that of the engineer and the industrial technologist, though where the distinction is to be drawn between professional and technical education he confessed that he would find it very difficult to say. At any rate, the position was pretty clear. We find ourselves confronted at the present time with a constantly increasing claim for the inclusion in Universities, besides the more ancient studies, of special branches of knowledge which relates directly to the avocations of life, and particularly those of industrial life; and the question is: What should be the policy of the Universities in the face of this demand? It is, of course, not altogether new. For a considerable time past the subject of engineering has been included among University studies, and, in a less degree, agriculture also. But until recently the teaching of these subjects has been mainly theoretical in its character; and it is only in quite modern days that laboratories have arisen in order to develop the more experimental side of instruction.

In his paper, the author strove primarily to set forth what might be called the fundamental reasons for believing that the association of Universities with technical and professional studies should be encouraged. During the last thirty years, there had, he said, been in this country and in some others a very important movement for the establishment of types of education intended to minister more directly to the needs of those whose life is to be spent in the industrial world. The movement had arisen in the industrial world itself, and had brought forth a kind of education and a kind of institution with which the Universities had had very little to do. This education extended through all grades, and reached, so far as its intellectual difficulty was concerned, what was undoubtedly a University level. The alternative presented itself to the Universities of associating themselves fully and wholeheartedly with these new branches of education, or of leaving them to find their own organization, control, and support entirely or mainly outside. It was, he thought, to be regretted that the Universities were not more forward in regulating and controlling the movement to which he alluded, and in preventing a division in educational enterprise which had led, and was likely to lead, to considerable difficulties and disadvantages.

Professor Smithells endeavoured to give reasons for his own belief that the isolation of the highest technical and professional education in separate institutions apart from Universities is, as a general policy, not to be recommended. On the one hand, he could see no reason why Universities, which at their inception, as is well known, were largely concerned in qualifying men with special knowledge for the performance of their life-work, should not now cheerfully extend that function beyond the so-called learned professions, to all those occupations of life which require for their successful pursuit not merely the high level of intellectual capacity and that general cultivation of the understanding and character which Universities are always willing to supply, but acquaintance with the new realms of special knowledge that are constantly being won by human experience, and that constitute, in fact, sciences in themselves. He believes that studies of this kind connected with industry, when associated with a University, would not only be supplied with the intellectual nourishment and the contact with abstract knowledge which help to keep them expansive and wholesome, but that they would react in a most beneficial way also on other studies of which the character was in some respects the opposite of their own. He deprecated very strongly any educational policy which tends to give emphasis to a mischievous distinction between useful and useless knowledge; and he deplored any proposals which would deprive the younger generation of the

potent influences which spring from the association, in places of learning, of people of widely different interests and destinies.

Dealing with the question from the national standpoint, Professor Smithells said it seemed to be one of great importance. While there could be no doubt of the urgent need of much more intellectual efficiency and technical skill in the conduct of our industrial, economic, and social undertakings, it would, he considered, be a calamity if in the eager attempt to meet this need we neglected other considerations of still greater importance. Our ancient Universities have been esteemed, above all else, for the impress they produced—more, he thought, by their corporate life than by their scholarship—on the character and ideals of the men whom they had sent out to the service of the nation; and no one could doubt that, directly and indirectly, they had helped very largely to foster and maintain certain characteristics and human qualities which we most like to think are distinctive of our race. If these traditions were preserved throughout English University life, as there was no reason to doubt they would be, the wider their sway could be extended the better; and, in the author's opinion, we could hardly look with complacency upon any tendency in the organization of education which threatened to under-estimate their value, or to remove a great section of the community from their influence.

Among some questions of detail mentioned in the paper, the most important perhaps related to a proposal for a closer connection between Universities and associations representative of different professions and industries, which have among their objects the regulation of the training and the intellectual standards which are deemed essential for their several callings. Professor Smithells thinks it is desirable that the interest and the experience of such associations should be brought in to aid the Universities in the organization and control of the departments which are concerned with technical studies. There appears to be no more reason, for example, why in a subject like engineering the organized body of the profession should not participate just as much in the regulation of University studies of this subject as the medical profession does in effect in the study of medicine. The same thing applies generally to organized bodies which are deeply concerned in the education that is preparatory to the calling they represent. This idea has, the author believes, only been realized to a very small extent; but in some of the newer Universities great importance is attached to the co-operation, in the administration of departments of applied science, of Advisory Committees consisting of men for the most part actively engaged in the industry to which the applied science is related. At least one case could be quoted where such a Committee is composed mainly of representatives directly delegated from the professional associations representative of the whole industry concerned. The gain to the University of such relationship is very great. Not only does it bring with it a large amount of valuable advice to the service of the University, but it ensures a vitalizing contact between the University and the world outside. The extraordinarily rapid transformations which industries undergo at the present day lead to the danger of a teacher becoming out of touch with current developments and new needs, if he is isolated within the precincts of a University. His intercourse with industrial leaders is facilitated by the existence of such Advisory Committees.

Professor Smithells alluded to the great difficulty of securing teachers of applied science, and to the qualifications which one would seek in such teachers. He also emphasized the importance of keeping a faculty of technology in close association with a faculty of science for all deliberative purposes, so that no conflict might arise as between pure and applied science. He mentioned the difficulty which attends the introduction of applied science in the arrangement of curricula—viz., the restriction of contributory studies. He pointed out that this difficulty is not peculiar to applied science, but is found in all kinds of specialized instruction. He thought, however, that we have already sufficient evidence that curricula embracing applied science can be arranged within practicable limits of time, without any undue sacrifice of fundamental studies, or any depression of the intellectual standards proper to a University.

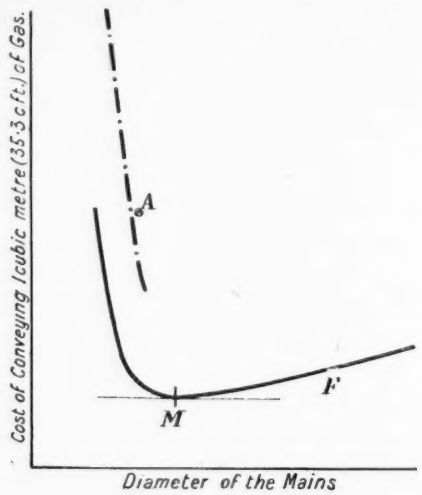
In conclusion, the author said that in connection with the subject of his paper many questions arose which he had not attempted to discuss. The questions of affiliation and of the recognition of studies in outside institutions often bring great administrative and constitutional difficulties; but these and other matters would, no doubt, be dealt with by those who have had special experience.

In the course of the discussion on the paper, Sir Isambard Owen, the Vice-Chancellor of Bristol University, deprecated the practice, now prevalent in this country and in France, of treating a University degree in a professional subject as being a professional qualification. He suggested that the Universities should separate the two things; and for this purpose he recommended the establishment of a joint curriculum and examination for the qualifying diploma for all the Universities federated together, with, later on, separate and more specialized degree examinations. Professor Henry Louis, of Armstrong College, Newcastle, considered, as an engineer, the question: Why do the technical industries not rate more highly the college-trained man? He said it was only in Great Britain that employers to-day openly expressed their preference for the so-called practical man. It was largely because too many engineers were obsessed with the fetish of apprenticeship as the only mode of qualifying.

HIGH-PRESSURE GAS DISTRIBUTION.

It was mentioned, in the review of the proceedings at the recent Congress of the Société Technique du Gaz en France that M. André Grebel opened a discussion on the subject of "High-Pressure Gas and its Distribution at a Distance." The following is a summary of his remarks and of those of other speakers.

M. Grebel began by stating that having, ever since 1904, been occupied, in association with M. Mallet, with the question of high-pressure distribution, he thought he was in a position to make a communication thereon which would be of interest. He reminded the members that he had prepared an abacus [reproduced in the "JOURNAL," Vol. CXIV., p. 104] for calculating the flow of gas in mains. Whenever anyone took up the subject of the conveyance of gas by boosting, the classic formulæ were always discussed. But it was acknowledged that the formulæ of Monnier, Pole, and Schilling were not applicable to large pipes or to cases of high-pressure distribution. There was a much more important problem, which many people seemed to ignore—viz., that of determining mathematically the condition of installation corresponding to the minimum working expenses, including the sinking fund for paying off the cost of the mains. By adopting high pressures, it was possible to reduce the diameter of pipes; but the work of compressing was considerably increased. American engineers could not escape from the obsession of the distribution of natural gas, the initial pressure of which frequently reached many atmospheres. They had consequently been led to adopt very high pressures; and in England and Germany there was a tendency to imitate them. In France, a good solution of the problem had been arrived at; but the pressures adopted were too low. [In an article which appeared in the "Journal de l'Eclairage au Gaz" rather more than three years ago, M. Grebel showed that it was possible to calculate the working expenses corresponding to the different diameters of



mains; the minimum being at the point M (the broken line representing the high-pressure curve) on the accompanying diagram, which is a reproduction of one which he drew upon the blackboard in the course of his remarks.] Americans, on the other hand, employed pressures which were much too high. They economized on the initial expenses for the mains; but the net cost of transport might be three or four times the minimum—about the point A in the broken line. In France, diameters of mains were chosen which corresponded to the portion F of the solid curve. The determination of the diameter of the main or of the most economical pressure was very difficult; and it was regrettable that a decision should be come to on considerations such as the maximum pressure of the compressor, which are adopted *a priori*, instead of being calculated. M. Grebel thought that, since it is necessary to have a certain reserve of storage capacity, it would be better to put up some of the gasholders in the districts served, instead of erecting them all on the spot where the gas is produced. This system of indirect distribution would, he said, allow of the compressing-stations being better utilized, and give greater security. Another question was to know exactly how far it would be worth while to increase the capacity of works and the area they supplied. This question was very difficult to settle in a general way. Practical sentiment, however, had fixed the limits of economic distribution at one or several dozens of kilometres.

In the discussion which followed, M. Casaubon remarked that it was difficult to estimate the future consumption, and that it was necessary to take it at half the period of the concession. M. Grebel said it was quite understood that the estimation of the consumption was difficult; but this was not a reason for deciding the diameter of a main without working it out. The electricians always put down their mains in accordance with calculations. M. Foillard, replying to M. Casaubon, who had raised the objection that there was no compressor equal to meeting the case of distribution direct, without a gasholder, said the problem was mechanically solved by rotary compressors.

IRISH ASSOCIATION OF GAS MANAGERS.

ANNUAL GENERAL MEETING IN DUBLIN,

JULY 9, 1912.

PRESIDENTIAL ADDRESS

of Mr. C. B. OUTON, of Inchicore, Dublin.

Gentlemen,—In the first place, allow me to thank you for the high compliment paid me by election to office this year—it being the second occasion you have so honoured me.

THE BUSINESS BEFORE THE MEETING.

We are to be favoured presently by several papers on subjects in which members are keenly interested. Mr. T. Hornby, of Longford, will give his experiences of sulphate making. As this part of the gas plant is one of the most remunerative, and as many works possess the necessary plants, the paper should evoke a good contribution by way of experiences of the members generally. Mr. A. M'I. Clelland, of Belfast, will describe his recent practice in high-pressure lighting; and perhaps no better choice of subject could have been made, as the phenomenally high duty per cubic foot developed in these lamps has resulted in considerable economy in working results. Personally, his experiences will be of great assistance to me, as an early choice of a large installation will shortly be made for the Inchicore Works. Mr. Tyndall, of Wicklow, is kindly contributing a paper on his hydraulic main experiences, which opens out a subject for discussion not hitherto touched upon in debate by our Association. Our Vice-President will also contribute his remarks on upright and inverted burners; and I trust there will be a general discussion on each subject, as indicative of the interest taken by the members.

A difficulty presents itself to me in making a few opening remarks, owing to the fact that I, in common with the majority of my fellow brethren in this Association of Gas Managers in Ireland, represent only small or medium-sized gas-works, where modern practices have little opportunity of being tested till efficiency and economy warranting the outlay have been proved after several years of practice. Accordingly, any examples of "slopers" and "verticals" are as yet extremely rare on this side of the Channel; and visitors to our works will notice the employment of "horizontals" with regenerative firing, which still hold the field so far as Irish practice is concerned. It will be generally found that otherwise we endeavour to keep ourselves abreast of the times and as up-to-date as possible.

THE RECENT COAL STRIKE AND ITS LESSONS.

Doubtless there are few gas managers who have not suffered more or less from the recent regrettable coal strike, and escaped the attendant anxiety on shortage of supplies. In my own case we had to be satisfied with carbonizing house coal with poor results and extra cost of purification. One lesson to be learned (and which I believe was first mooted in the "JOURNAL") is that our former ideas of coal storage will have to become amplified in view of any future dispute, and improvements at the various works will lie in the direction of larger covered stores. Our judgment will be based upon the consideration of loss of interest on increased coal stocks, as compared with the enhanced prices demanded during the recent shortage and the extra delay involved by the exceptional demand for waggons and steamers to balance the former delay of deliveries. Probably a future minimum of two winter months' supply will satisfy the average demands of Irish managers.

This is hardly the occasion for entering into the merits or demerits of the dispute; and few will grudge the miner some reasonable allowance when the seam gets faulty and does not yield an average return. The inevitable concessions to the miners must react on the issue price to the consumer, and gas undertakings will keenly watch that the increase of price is commensurate only with the proportionate increase of wages, and that colliery owners will not seize the opportunity to unduly inflate their own profits. The contracts for the coming year will considerably govern the prosperity of gas undertakings by way of profit-making; and it will afford them some consolation that other lighting competitors will be equally affected by any change of coal rates.

One effect of the coal strike is the advantage it gave for oil purveyors to extol their own wares, and elaborate upon the alternative extended use of oil for boiler heating and general power purposes. The additional use of petrol during recent years has caused larger quantities of the crude petroleum to be handled, and the huge amount of the heavier fractions lends itself to the economical heating of boilers. These are patent facts which may well bid the miners pause ere they commit themselves to any repetition of the recent calamitous coal strike; for depend upon it the ultimate effect will react upon a reduced output, when the laws of supply and demand will speedily regulate the price of the competing steam-raising commodity. Apart from the question of increase of storage by way of preparing for any future contingency, one of our members has suggested for discussion the consideration of the steps Irish gas managers should take in making gas otherwise than from bituminous coals. It has been proposed to manufacture producer gas from peat and then enrich it by oil. However much one would desire to realize such an ideal, it must be remembered that owing to the large percentage of water and ash contained in peat it might be found to be commercially unprofitable to handle so large a bulk in proportion to the carbonaceous matter contained. Yet another idea is prompted by the recent resuscitation of the development of the Castlecomer coalfields in County Kilkenny. Why not enrich the producer gas from such Irish coal as this, in view of a repetition of our present year's experience? It would give us still another string to our bow. Perhaps these suggestions will prompt some managers to make working tests with a view to determining their practical and commercial utility.

COMPETITORS OF GAS.

It should be remembered that electric light is not by any means our only opponent; for petrol gas and acetylene have been lately coming to the fore. These should render the revision of the issue price to the public one of the most serious subjects for several gas companies. I am quite aware that many of my colleagues have to contend with additional freights to those more favourably disposed around the coast, and many inland towns also have to face a comparatively small number of gas consumers. But I cannot reconcile some of the high rates demanded, even in the face of these difficulties; and the higher prices ought to be revised at an early date. If this be done, there would be reasonable expectation of a greater demand both for heating and lighting, and the supremacy of coal gas production would then be maintained. These remarks are prompted entirely by my personal knowledge, gained by several years of supervision of the competing types of illuminants just referred to.

GAS STUDENTS AND THEIR TRAINING.

I have often been struck with the absence of facilities given by the various educational bodies in Ireland for the promotion of the study of gas engineering and its allied subjects, and cannot help contrasting the treatment meted out to students of electric lighting, for whom every possible encouragement is given in every large town and city. It would almost appear that gas engineering was not deemed as scientific as that of electric engineering. In the latter case, graduated courses of instruction are provided, commencing with physics, mechanics, magnetism and electricity, electric lighting (continuous and alternating), electric power, &c., and practical wiremen's work is also provided for improvers in erecting installations. A similar systematic course in the gas engineering industry is required, in which mechanics, pneumatics, physics, heat and light, chemistry, with special reference to the testing of coal gas, water gas, producer gas, and waste flue gases, the influence of temperature upon quantity and quality of gas yield, gas analysis and principles of combustion, as well as a good general technology as applied to gas-works construction, apparatus, and working, are the chief outlines of the course. The draft syllabus for the technical school course for gas-fitters issued by the Manchester District Institution of Gas Engineers might be copied in Ireland with considerable advantage; and its adoption in day and evening classes would put students on an equality with the wireman in the electrical division. Moreover, the possession of a diploma in gas-fitting should stamp the holder with a hall-mark of proficiency, and enhance his chances of success in obtaining continuous employment at the best rates. Such certificates are just as important as similar ones which are recognized in the plumbing industry. When these opportunities are offered to the younger aspirants in the gas engineering profession, and are suitably taken advantage of by gas-works assistants, there will be greater likelihood of vacancies being filled by local competitors.

MANAGEMENT OF SMALL GAS-WORKS.

My attention has been called to the low salary for a manager recently offered in an Irish gas-works of a very respectable output—the figure being totally incommensurate with the degree of knowledge and technical skill such an appointment should demand. Doubtless this is due to a proper want of appreciation on the part of the directors, whose commercial instincts outrival their ideas of the qualifications which should be possessed by the manager. In gas-works of large magnitude, specialists are appointed in the several departments, with the best results. In smaller works, however, such as those which form the large majority in Ireland, the manager must be his own mechanic, chemist, draughtsman, competent in the supervision of men under his control, and must be also possessed of sound commercial abilities in pushing his commodity before an ever-critical public, and to show considerable tact in dealing with complaints. When such a combination of qualifications is demanded, the labourer is worthy of his hire, and a remuneration considerably higher than a well-paid mechanic should be freely offered. I venture to suggest that the inevitable result of a second-rate salary will only be to command a second-rate man, to the detriment of the prosperity of the gas undertaking.

IRISH RAILWAY GAS LIGHTING.

As I am the only railway representative among you, perhaps the work in which I am chiefly engaged will be of interest. The Great Southern and Western Railway, which I have the privilege of serving, purchase gas from 29 private companies for lighting that number of stations, platforms, offices, goods stores, and approaches, all of which are fitted with incandescent mantles. In addition to this, the Company own ten small gas-works; the largest being situated at Inchicore, with an annual make of some 30 millions. The latter supplies the locomotive, carriage, and waggon shops—a visit to which will well repay the members of the Association, who will notice that, in addition to the usual application of gas to lighting and heating, special appliances for

tempering high-speed tools, melting of Babbit metal for journals and brasses, will be of particular interest. Special attention would be directed to bunsen burner-rings, up to nearly 7 feet diameter, for heating tyres previous to being shrunk-on to their respective wheels. The principal shops are lighted by 900-candle power lamps, and the illumination is deemed to represent one of the best examples as yet applied to railway shops. In the new large carriage and waggon shops in course of erection, which will embrace an area of nearly 3 acres, it is intended to instal the most up-to-date inverted mantle lamps on the high-pressure system. The total illumination will be about 70,000-candle power.

A special feature of interest in the local coal-gas works is the employment of a portion of the residual hydrocarbon which is deposited in the receivers under compression at an adjoining oil-gas works. Several years ago a sample of this hydrocarbon was submitted for analysis, and yielded 30 per cent. benzol. I ascribe the almost complete absence of trouble from naphthalene deposits for the past twenty years to the solvent action of the benzol, although we have the benefits of good heats in our benches. One exception only occurred during the past month, when, through alterations, the hydrocarbon tank was thrown out of action, and house coal had been used during the coal strike, we had the unusual experience of finding naphthalene in the inlet pipe to our large holder, which caused some trouble to locate the cause of the back-pressure. The sulphate plant of the continuous type which was described in my paper read at our annual meeting in 1905, at Dundalk, has more than fulfilled all expectations. Few members should rest content until they have a plant installed; for the profit arising from the sale of the salt has repaid the cost of the apparatus several times over.

At another of the Great Southern and Western Railway works, erected some six years since at Rosslare Harbour, in County Wexford, an unusual example will be found where the coal gas is partly manufactured for the entire illumination of the pier head and station, and partly for the supply to two 82 H.P. gas-engines, which are coupled direct to dynamos for the generation of current at 525 volts for transmission to the electric cranes at the pier head. Their working has been most reliable; and the low price at which we have been able to produce the gas has reacted on the equally economical cost per unit of the current. Two other stations are fitted with acetylene, and one with petrol gas; and altogether I think you will agree with me that this Railway Company has been one of the principal general consumers in Ireland.

The application of gas lighting as applied to railway carriages has also received the greatest encouragement from the Company, who own 663 vehicles. Of these, 641 are gas-lit, in which nearly 4000 lamps are employed; the few remaining vehicles being lighted by portable oil-lamps. The total mileage of the line being 1121¾, it will be understood that the continual maintenance of gas to the carriages requires some considerable amount of supervision; and we aim at scrupulous cleanliness on the part of the lamp-cleaning and upkeep.

At the annual meeting of the Association held at Coleraine in 1893, it was my privilege to bring before you a description of the erection of an oil-gas works at Inchicore, which possessed several features of considerable interest. I may say that the economical and efficient results during subsequent years have borne eloquent testimony to the wisdom of selection of this form of illuminant for carriage lighting; and I am happy to announce that not one mishap has been occasioned during the whole of the succeeding 3 years. On the acquisition of the Waterford and Limerick Railway in 1900, it was found necessary to build a similar sized gas-works at Limerick. Each of our two gas-works is capable of supplying some 15,000 cubic feet of gas daily, compressed to 150 lbs. per square inch. Fourteen pairs of cylinders are now engaged in carrying the compressed gas to Cork, Mallow, Rosslare Harbour, Tralee, Waterford, and Maryborough, for charging those carriages which do not ply in and out of the two manufacturing stations, and thus the regular supply of gas to the entire system is maintained. My long experience of this portion of the work enables me to state that the cost of upkeep, including all repairs and renewals, has proved the oil gas system to be the most economical and perfect; the relative initial and working costs of rival systems bearing very unfavourable comparison.

Gas lighting for carriage work has received a great impetus for several years owing to the successful introduction of the inverted mantle. The Company have already equipped 270 vehicles with incandescent mantles; and the balance is being fitted up as quickly as possible. We use a 50-candle power mantle indiscriminately for first, second, and third class compartments, and 25-candle power for corridors and lavatories; and passengers have now a degree of comfort for reading purposes which will bear favourable comparison with any railway in Great Britain. It will be perhaps interesting to you to learn that, although the carriages are run at top speeds, and also subjected to occasional rough shunting, the average life of our mantles is 21 weeks. Experiments by way of compressed coal gas are in early contemplation, the mantles being particularly well adapted for the reduced candle power of this gas; and I hope to bring the results before you on an early subsequent occasion. I trust in this brief outline of lighting work supervised by me it has been proved that gas lighting is held in high repute by the premier Irish Railway.

ECONOMY OF GAS MAKING AND USE.

I was much struck with the warnings issued last year in one or two leading scientific associations over the restricted period available for the world's coal output—a period of 175 years being mentioned as the probable limit. There are few who would not view such a statement with a feeling of equanimity, and rest assured that there is quite sufficient to last our time. But still I think the gas industry has every reason to congratulate itself on recognizing the necessity for economy in its coal treatment by the gradual increase of results attained. It was doubtless the intention of scientists to direct attention to the undue waste occasioned principally by smoke production through incomplete combustion, and deleterious effect on the health of cities caused by the prevalence of dense fogs. From the transition of the coal from the retort to the burner evidence will be adduced on all sides of the gas industry of the desire to prevent waste. The regenerative principle applied to retorts really implies that a large portion of waste heat which would be otherwise discharged up the chimney stack is utilized in warming the incoming air for combustion, while the employment of gaseous fuel has resulted in a perfection of combustion which was undreamt of a few decades ago in the direct-firing furnaces. The high duty and economy obtained in the many uses to which coal gas is commercially applied to various forms of heating burners, cooking-stoves, and gas-firing have produced the highest results by way of economy; while the cleanliness and comfort to a household so fitted forms a marked contrast to the employment of the open coal fire and range, with its volumes of unconsumed smoke evolved from the chimneys.

All these points are so well known to members as to almost weary one by their reiteration; but it is the economy as applied to light which holds pride of place. I well remember being employed some thirty years ago as an assistant to a then well-known gas engineer, in connection with the early experiments of one of the first commercially successful regenerative lamps for domestic use. This was followed by the Wenham and other similar types of lamp, all aiming at the principle of heating both gas and air for increasing the temperature of the flame. It was then thought that the pinnacle of perfection had been reached; and yet what vast strides have been attained during the last three decades. The invention of vertical and afterwards that of the inverted mantle has eclipsed all previous efforts, and whereas a duty of 6 to 7 candles per foot was attained in the regenerative lamp, no less than from 18 to 23 candles per foot are yielded in the modern low-pressure incandescent light. I venture to think that when the history of the inventions of the Nineteenth Century comes to be compiled, that of the mantle will rank in point of importance as the discovery of the reversibility of the gramme machine. And yet even the results just quoted have been quite eclipsed during the past two or three years by the introduction of high-pressure lighting. During the recent Dublin Exhibition, we were charmed with the high-pressure upright mantle lighting yielding 30 candles per cubic foot. In that short interval, increase of pressures has resulted in the further rise of flame temperature, and duties of 50 to 60 candle power are now freely quoted.

Has the summit of perfection yet been reached, and has the last word yet been said? Judging from the results of even recent years, we are tempted to strive after further ideals, and unravel further secrets from Nature. Many inventions owe their inception to illustrations afforded by Nature—the shape of the submarine and torpedo from denizens of the deep, the modern aeroplane from the study of the flight of birds. So perhaps future scientists may derive inspiration for further attainments in economy of lighting even from the common glow-worm. We pride ourselves on being workers in an industry possessing a glorious past, unrivalled in point of economy and hygiene at the present, and we venture to predict that the future has even brighter prospects in store.

In an article in the Engineering Supplement to "The Times" last Wednesday, Professor Lewes sketched the progress of the use of acetylene in the past twenty years—beginning with the production of calcium carbide in an electric furnace by the Canadian engineer Mr. Thomas L. Willson in May, 1892. The introduction of acetylene as an illuminant, and Professor Lewes's association with it, were noticed in the "JOURNAL" at the time.

Some months ago, an announcement was made in the "JOURNAL" that a concession had been granted to erect works, lay mains, and carry on the usual business of a gas undertaking in Manilla, the capital of the Philippine Islands. It was then stated that Mr. H. King Hiller was acting as Consulting Engineer in connection with the scheme; and we now learn that Mr. A. O. Jones has been successful in obtaining an appointment with the Company which will probably extend to four years. The works are now in course of erection, and Mr. Jones's preliminary duties will include the organizing of propaganda work in advance of the gas supply, and subsequently the management of the undertaking. Mr. Jones is a native of Dudley, and a son of the late School of Art Master. He was educated at the Queen Elizabeth Grammar School. In 1897, he was articled to Mr. Thomas Glover at the West Bromwich Gas-Works, at which time large extensions and alterations were in progress; and since the appointment of Mr. S. O. Stephenson in 1901 to the managership of the Tipton gas undertaking, he has held the position of the Assistant Gas Engineer to the West Bromwich Corporation. While wishing Mr. Jones the best of luck in his new sphere, his departure from England will be much regretted by the members of the Midland Junior Gas Association, of which he is a Past-President, and in whose proceedings he has always taken a keen interest.

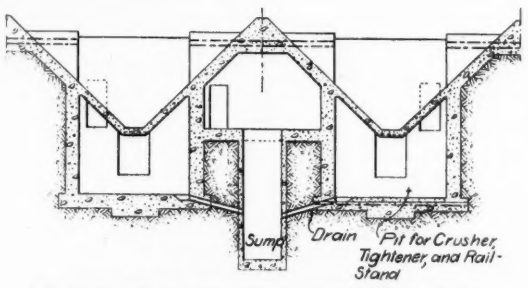
STORAGE OF COAL UNDER WATER.

Arrangements at Omaha (Neb.).

In connection with the paper on "The Supply of Coal to Gas-Works," read by M. Masse at the recent meeting of the Société Technique du Gaz en France, and given in the "JOURNAL" for the 25th ult. (p. 983), where the author recommended the storage of a portion of the coal under water, attention may be called to the arrangements completed towards the close of last year by the Omaha (Neb.) Electric Light and Power Company for dealing with the coal in the way suggested, as described and illustrated in a recent number of "Engineering Record."

Building a 6000-ton submerged pit on piles driven through quicksand to the rock, erecting a 46 ft. 8 in. reinforced concrete wall as a fire-wall, and protecting the concrete in the floor from the bite of the grab bucket by imbedded rails, are some of the features in the emergency coal-storage pit built in connection with improvements and extensions to the existing 13,000-kilowatt power plant of the above-named Company. The coal is stored under water to prevent spontaneous combustion; and the necessity for piling-up two months' supply was illustrated during the past winter, when the Company were called upon by dealers to furnish coal for household consumption, and were able to meet their urgent requests. In anticipation of such an emergency, 10,000 tons had been stored—thus overloading the pit nearly 70 per cent. above its rated capacity.

The storage pit is located west of the power-house, and separated from it by two receiving hoppers over which the switch track runs. A grab-bucket coal-crane spans the pit and the receiving hoppers. One end travels on a girder on the building, and the opposite end on the top of a high wall carried 26 feet above the ground level to protect the adjacent buildings of the Omaha Ice Company from fire. Three of the walls of the pit rise 22 feet above the floor; while the high wall is 46 ft. 8 in. high above the foundation.



Longitudinal Section through the Coal-Receiving Hoppers.

Preliminary soundings indicated rock at depths of 25 to 35 feet below the ground surface. While all walls were to be built on piles, the floor was to rest on the earth excavated to about 18 feet below the ground level. After a short stretch of the excavation for the high wall had been made and the piles driven, the quicksand was found too unstable to hold the piles in position horizontally. These few piles were straightened by ramming stone and lean concrete between them; but for the remainder of the work the engineers decided to raise the level of the walls and floor 4 feet—thus bringing the tops of the piles into the more solid clay overlying the quicksand stratum. It was also determined to place piles on 5 feet centres under the whole floor area. Piles were driven to the rock and cut off at the level of the under side of the 12-inch floor. A cap of concrete, 2 ft. 6 in. square and 12 inches deep, was placed round each of them, with the twofold idea of leaving in place as much of the more solid earth as possible, and still obtaining the maximum capacity in the pit. This method also provided wide capitals on top of the piles upon which the floor rests—thus cutting down the floor-slab span. The whole load was estimated to come on the piles and none of it upon the earth.

Loads on the floor and walls were estimated at 80 lbs. per cubic foot, due to coal saturated with water. To arrive at this figure, experiments were made on the job with the local crushed bituminous coal. In the design of the high wall, the buttresses are assumed to take the cantilever load, while the wall itself acts as a slab supported by the buttresses, which are 2 feet thick and 14 ft. 6 in. apart. A water pressure of 23 feet may come on the walls from the outside in case of high water, as well as the ordinary earth pressure, Reinforcing steel is therefore inserted on both sides of the walls. The high wall is 2 feet thick on top and 4 ft. 6 in. thick at the top of the 17-feet base, which is 2 feet thick and extends inside the pit. There is no batter on the outside of the high wall.

The floor is not figured for upward pressure, as provision is made to permit ingress of water at several points in the walls; but the 30-lb. rails placed on 12-inch centres in the top of the concrete would act as top reinforcing bars if by mistake the holes should be plugged, and an attempt made to pump out the water when the river was in flood. The ¾-inch reinforcing bars in the bottom of the floor slab run in a transverse direction under the rails. Though the floor slab rests on the foot of the high wall, no attempt was made to create a bond between them.

The grab-bucket coal-crane is guaranteed to deal with 50 tons of coal per hour from the cars to the centre of the pit. The latticed runway girders are 143 ft. 3 in. long centre to centre of the wheels. They are wind-braced on the outside, and separated sufficiently to permit pulling up the 4 ft. 6 in. grab-bucket between them. The crane has a lifting capacity of 5 tons.

Two coal-receiving hoppers, 25 ft. 8 in. by 37 ft. 4½ in. in plan and pyramidal in shape, are built of 12-inch and 18-inch reinforced concrete slabs. On one of the sloping sides near the apex a 12 in. by 12 in. sliding gate, operated from the crusher pit, regulates the flow of coal into the crusher. From the latter, it drops into the buckets of the conveyor, and is carried to the east end of the boiler-room in the basement; then it rises to an elevation above the bunkers over the boilers, and is dumped at the point desired. For the supply of coal to the existing plant, the conveyor from the north receiving hopper discharges into a cross conveyor, delivering into bunkers above the existing boilers.

Ashes are picked up in the basement by the coal-conveyor, and dumped into a concrete-lined steel ash-bunker to the west of the last coal-hopper. From here the ashes are delivered by shoot to cars standing over the coal-receiving hoppers. In placing the concrete lining in the ash-bunker, angles were riveted up and down the slopes of the hopper sides. Holes were bored in the angles for ¾ inch reinforcing rods. This method was used to tie the concrete lining to the steel sheets, and assist in holding the green concrete while placing on the steep slope.

Two drivers with 45-feet and 55-feet leads, in which 2500-lb. drop hammers were mounted, were used to drive the piles under the walls and floor. One of the drivers was mounted on a turntable base, and, when placed in the excavation to drive the floor piles, rested on rollers. Before attempting to excavate for the high wall, sheeting was driven each side of the neat lines of the base, and the adjacent brick building of the Ice Company underpinned. A cofferdam construction of wales and braces was inserted before excavating to the final depth. The early excavation was made by teams, which hauled the material out at one end up a runway. Finally, a derrick with a boom 60 feet long handled the material by a grab bucket to an elevated hopper under which the waggons were driven.

ILLUMINATION IN FACTORIES.

In the last number of the "JOURNAL" (p. 38), we gave the first portion of the special report of Mr. D. R. Wilson on "Illumination in Factories." We now extract some particulars in regard to the industries investigated—viz., cotton and linen weaving, cotton and flax spinning and preparing, composing-rooms in printing works, and machine-rooms in clothing and handkerchief factories.

COTTON WEAVING.

Here the lighting (daylight and artificial) is both uniform and symmetrical—that is to say, the illumination intensity is comparatively constant throughout a given shed, and such variations as exist occur and recur at regular intervals throughout the shed, and may therefore be designated "periodic."

Daylight Illumination.—Cotton weaving is almost exclusively carried on in "sheds" or one-storey buildings, often of very large size, with "saw-back" roofs, the short sides of which are glazed. The incidence of light is, therefore, almost vertical; and since the "plane of work" is horizontal, this is the best possible arrangement for adequate illumination.

Owing to the large expanse and position of the windows (the ratio of window area to floor space varying from 1·5 to 1·3), the lighting is very efficient compared with ordinary side-lighted rooms, and also very uniform owing to the regular distribution of the windows. Such variations as occur may be distinguished as "periodic," depending on the position of the point of measurement relatively to the window; and "accidental," caused by obstruction of light by adjacent buildings, humidifiers, dirty or old windows, harness of jacquard looms, &c. The usual window efficiency of sheds appears to vary from about 16-100ths to 35-100ths.

Artificial Lighting.—In the arrangement of the artificial light sources, the object has evidently been to obtain a comparatively uniform light on a horizontal plane free from shadow. To attain this, it is the usual practice to place the lights rather high (6 ft. 3 in. to 7 feet), in such a position as to avoid casting the shadow of the weaver, and to throw a fairly even light on the work. The intensity of the illumination varies considerably in different sheds. In those lighted by electricity, it is customary to use one unit for every pair of looms, situate above the head of the weaver midway between the looms. With powerful gas systems, such as the high-pressure and inverted incandescent, one unit is often supplied for every four looms, and is then placed at the centre of every group of four looms. In other places, more particularly for coloured and fine goods, the usual allowance is one unit to every pair of looms. Jacquard looms and wide "sheeting" looms are usually provided with double the above allowance.

Lighting by gas is probably the most common method, though in large factories electric glow lamps are much used; and in such places the electric current is often generated on the premises,

High-pressure gas systems, in which the gas is compressed on the premises previously to being burnt, are being largely introduced; and the same applies to various inverted incandescent systems, in which the incandescent mantle instead of being cylindrical and upright, as in the old method, is much smaller, hemispherical, and directed vertically downwards. The advantage of these over the old upright incandescent gas system is obvious, in that there is no framework under the source of the light, and so no shadow is cast directly under the burner.

Ordinary flat-flame burners still exist; but they are gradually being replaced by more modern methods. They are objectionable in many ways, as being liable to flicker, giving off much heat, vitiating the air, and involving the consumption of 12 to 15 times as much gas per candle-hour as compared with the other gas systems. When electric glow lamps are used, the unit is generally a 16-candle power carbon filament lamp. Metallic filament lamps are rarely met with—it is said that the constant vibration causes their fracture; but they are common in the Irish linen-weaving sheds, where the vibration is probably equally great.

There seems to be little to choose between lighting by electric glow lamps and by modern systems of incandescent gas. Electric light has the advantage of being constant, and of requiring little attention beyond systematic dusting and renewal. The gas systems generally produce a whiter and more powerful light; but the units are apt to vary much in efficiency, owing to the liability of the mantles to deteriorate. Careful attention is, therefore, required to replace any that show signs of weakness. Electric light, of course, causes no vitiation of the atmosphere; and in the modern systems of gas lighting the amount of gas burnt is so small, and the combustion so complete, that the effect on the air is minimized.

Linen Weaving.

Daylight Illumination.—The weaving of linen is carried on mainly in sheds exactly similar to cotton-weaving sheds.

Artificial Lighting.—In this respect there is an interesting difference between cotton and linen weaving. The albedo of linen is about 30 to 40 per cent.; while that of grey cotton is about 60 to 80 per cent. The absorption of light is, therefore, about twice as great for linen as for cotton. For this reason, a very much more intense light is generally found. The source of light is commonly metallic filament electric glow lamps, or high-pressure and inverted incandescent gas-lamps; and the usual allowance is one unit per loom. This is fixed either vertically above the stretch of cloth, or immediately over the centre of the loom top, or highest point of the loom. In the latter event, glare is very liable to occur; and several instances were noticed where the lamps had been purposely diverted by the weavers in order to prevent the light from striking the eye. A good example of lighting found in a weaving shed is given in an appendix to the report. A "Selas" lamp is fixed immediately over the upper part of the frame. The resulting illumination is very intense (5 to 17 foot-candles), and the deep and wide shade both completely shields the source from the eye and also distributes the light over a wide area. Sufficient light for the general lighting of the shed is diffused and reflected; giving an illumination intensity of 0·6 to 0·8 foot-candle in the alleys.

Cotton Spinning.

The spinning of cotton, with its incidental processes, is almost always carried on in flats or rooms situated one above the other in a building of four or five storeys.

Daylight Illumination.—The general character of the daylight illumination may be described as follows: (1) The window efficiency is high at each end of an alley, but diminishes as the centre is approached—very rapidly at first, and afterwards more slowly, until the window efficiency at the centre is only about 1-100th to 1-500th of that at the ends. (2) The general illumination of the room increases with the height of the room above the ground, as the windows become less obstructed by adjacent buildings, and more of the sky becomes visible. (3) The window efficiency at the centre varies according to the nature of the machinery. In roving-rooms, containing frames with high creels, it is very low; next come ring-spinning rooms. The best lighted of all are the mule rooms, with their broad alleys or "mule-gates" and relatively low creels. Reeling rooms are an exception to the above, and are situated, as far as possible, either in a shed or on the top floor with skylights; the object being the same as in weaving—viz., the efficient lighting of a horizontal plane.

Artificial Lighting.—The most common method of lighting spinning and preparing rooms artificially is by carbon filament lamps, placed at intervals along the alleys. In ring-spinning rooms, where the frames are comparatively low, and no passage exists between the backs of the frames, a common arrangement for two rows of double frames is to space the lamps about 16 to 24 feet apart down each alley, in such a way that each lamp in one alley bisects the distance between two consecutive lamps in the neighbouring alley. With this arrangement there is found on walking down the alley a maximum illumination directly under a lamp and a minimum at a point half-way between that lamp and the one in the next alley. Between the two is a point immediately opposite the lamp in the next alley.

Probably the worst lighted of all rooms are the preparing-rooms. These generally contain several different kinds of machines—viz., cards, drawing-frames, roving-frames, &c.; and the lighting arrangements vary according to the type of machine. The part of the room containing the cards is often very insufficiently illuminated, and may even be dangerous from the point of view of liability to accident. In one room, for instance, the only source of light along the backs of a row of cards consisted of one gas-jet with reflector on the wall at the end of the alley, and one electric glow lamp 66 feet away. The illumination intensity midway between the two sources was only 1-100th of a foot-candle, or about the minimum illumination intensity to be found in a badly-lighted street. The roving-frames in the same room were also very inadequately lighted by two gas-jets 26 feet apart; the minimum illumination intensity being only 1-30th of a foot-candle.

Flax Spinning.

Daylight Illumination.—Flax spinning is carried on under conditions very similar to cotton spinning. Usually, however, the rooms are much narrower, and the spinning-frames are farther apart with wider alleys. The ratio of window area to floor space is, therefore, greater (1 : 9 to 1 : 5), and the window efficiency in the centre of the room far higher. Exceptions, however, occur; and in some alleys provided with a window at one end only, artificial light is used throughout the day. The efficiency of the illumination increases with the height of the room above the ground, owing to the windows becoming less obstructed by neighbouring buildings. As in cotton spinning, many of the preparing-rooms are badly lighted, in consequence of the obstruction of the light by the machinery.

Artificial Lighting.—For the artificial lighting of spinning-rooms, metallic filament electric glow lamps are commonly used, suspended from the ceiling to within about 3 feet of the floor; and they are arranged so as to illuminate a certain stretch of alley—being carried about as hand-lamps. The object of this low-placed light is to illuminate the under side of the vertical drawing rollers—a specially important point when breakage occurs. The lamps are protected from fracture by an outer covering of thick glass and iron bars. The source of light being so near to the point concerned, the illumination intensity on a vertical plane is high.

Composing-Rooms in Printing-Works.

A specially good light is required in composing-rooms on account of the dark colour of the material and trying nature of the work. The following remarks refer exclusively to works in large towns, where space is valuable and buildings much crowded together.

Daylight Illumination.—As a rule, composing-rooms are badly illuminated. Exceptions, however, occur in the case of rooms situated on the top floor of a building, which can then be provided with skylights; and whenever it is possible, composing-rooms are so placed. In other instances, the rooms are arranged side-lighted in the ordinary way; and as they are surrounded by buildings often within a few feet of the window, artificial light has often to be used throughout the day. The frames are generally arranged in rows across the room, with a window at the end; but if the row is more than a few feet in length, the frames at the end farthest from the window are in winter quite inadequately lighted, and cannot be used without artificial light. If the frames are not so arranged, even worse lighting results, owing to the obstruction of light by the high upper part of the frame. It should, however, be added that many composing-rooms in newspaper works are little, and sometimes never, used during the day.

Artificial Lighting.—The fine nature of the work and the dark colour of the material make it essential to have a very intense light. The albedo of the material appears to be about 5 to 10 per cent.; in other words, compared with a perfectly white surface, only about 5 to 10 per cent. of the light is reflected. The usual method of illuminating the frames is by means of lamps fixed a few inches above the upper case, so arranged as to throw the light upon the cases on both sides. According to the power of the unit, one lamp is made to serve either one or two cases on either side. In a few rooms, inverted arc lamps are in use, which give a pleasant diffused light similar to daylight; and in one room mercury vapour lamps were found, which, owing to the monochromatic nature of the light, are said to be very efficient for work in which very fine detail has to be distinguished. So far as intensity of illumination is concerned, the lighting is generally very efficient; but the source of light being situated in front of the worker, and comparatively low, there is great risk of glare unless the lamp is carefully shaded. This, unfortunately, is often (and, indeed, usually) not the case, and really satisfactory lighting is uncommon. Two examples of good lighting and two of bad are given in detail in an appendix to the report.*

Sewing-Machine Rooms in Clothing Factories.

Daylight Illumination.—Here, again, the work needs specially good light. The efficiency of the daylight illumination varies with the kind and size of room. The best-lighted rooms are situated on the top floor of a building, and are generally provided with skylights. On other floors, the lighting is often inadequate in the centre of a large room. The obstruction of light by machinery and plant is here much less than in other industries.

Artificial Lighting.—The artificial illumination is generally very efficient so far as intensity is concerned; the usual arrangement being a row of lamps along the middle of the work-table, with lines of machines on either side, so that each unit illuminates two machines. Sometimes double this allowance is made, and one unit is provided for each machine; the lamps being then arranged

* In this connection, reference may be made to the interesting paper by Mr. F. W. Goodenough, on "The Illumination of Printing Works," read before the Illuminating Engineering Society on March 19 last, and given in the "JOURNAL" the following Tuesday (p. 872).—ED. J.G.L.

along either side of the table. Glare is often noticeable, and is then generally due to the lamps being placed too low.

Two systems of lighting call for special notice. The first consists of 8 or 16 candle power electric glow lamps fitted on to the end of a bracket rising from the table on the side of the machine away from the worker. At a suitable distance, this bracket is provided with an elbow joint, which allows the lamp to be placed at any convenient distance from the needle of the machine. The lamps are well shaded through a range of 180° by metallic covers, so as to prevent the light falling directly on to the eye. The advantage of this system consists largely in the fact that the lamps are adjustable, and so can be placed at the distance best suited for the colour or albedo of the material worked upon.

The other system consists of small 4-volt glow lamps fixed on the under side of the upper part of the frame of each machine, and shaded in such a way that the light is cast directly on to the needle. The illumination provided is very intense, and might possibly be found excessive for light-coloured materials. For the dark materials used at the factory in question, the system appears to be extremely efficient, and has the further advantage of casting the shadow of the needle-holder in the right direction—viz., sideways away from the machine. For the general lighting of the room, ordinary electric glow lamps are provided in addition. Troublesome shadows are occasionally noticeable in this work, especially where several machines are illuminated by a single powerful unit.

Sewing-Machine Rooms in Handkerchief Factories.

Daylight Illumination.—Whenever possible, the machine-rooms are placed on the top storey of the building, and are then very efficiently lighted by skylights. This is the usual practice in modern factories; but where it is impracticable, and ordinary side-lighted rooms must be used, the illumination in the centre is generally inadequate, and recourse must often be had to artificial light in the daytime. So important is the need for good vertical lighting for this work, that in some factories the machines have been transferred from ordinary rooms to specially constructed one-storey buildings provided with "shed" roofs.

Artificial Lighting.—The artificial lighting is invariably excellent. The usual practice is to place the lamps at intervals down the centre of the tables—each lamp serving two machines. In each room there is one table set aside for specially fine work; and on this the allowance of lamps is doubled—two rows being provided, one along either side of the table, so that each lamp serves one machine. The lamps are generally effectively shaded, and glare is uncommon.

Conclusions.

As has been already stated, for the perfect local lighting of any point of work the three following conditions must be fulfilled: (1) The illumination must be adequate; (2) "glare" effects must be absent; (3) no troublesome shadows must be cast on the work.

Adequacy.—In deciding whether a given room is adequately lighted, consideration must, of course, be given to the nature of the work carried on; for it is obvious that a standard which may be quite adequate for one class of work may be totally insufficient for another. For this purpose, work may be divided into two classes, which may perhaps be described as "inspective" and "detective" respectively, according as the work entails continuous application of the eye to a single point or small area, or consists merely in keeping general watch over a given process—actual labour being demanded only when some fault occurs. Of the industries treated in this report, the making-up of clothing and handkerchiefs and composing belong to the former class; while the second class comprises cotton and flax spinning and preparing. Weaving appears to be intermediate between the two classes, though it tends to be "inspective" rather than "detective."

As regards intensity of illumination these two classes are sharply distinguished; but for each class again the adequacy of a given illumination intensity depends on the nature of the work, the fineness and colour of the material, &c. In "inspective" work the eye is continuously applied to a small area, and no change of view or contrast of light occurs. It is, therefore, especially important that the lighting arrangements should be such as to ensure both adequate illumination and absence of glare effects. The former object is generally attained with artificial light, as will be seen from the following table, giving a rough estimate of illumination intensities found in the different industries investigated.

Industry.	Albedo of Material.	Illumination Intensity.
Clothing (machine-rooms)	1–13	2–36
Handkerchiefs (machine-rooms)	60–97	2–8
Composing-rooms	5–13	3–30
Cotton weaving	60–80	1–5
Linen weaving	30 40	3–18

It is difficult to state the minimum absolute illumination intensity during daylight required for the satisfactory carrying on of "inspective" work. This minimum most probably varies with the individual and with circumstances, such as the rate of change of illumination intensity, since the slower the change the more gradual is the consequent eye adjustment. But it may be pointed out that the minimum recommended by Dr. Cohen for schools is about 2·5 foot-candles, which during winter, with an outside illumination intensity of 250 to 1000 foot-candles, would correspond to a window efficiency of 0·01 to 0·0025. It was noticed during the investigation that artificial light was being used in composing to supplement a daylight illumination intensity of 1·5 foot-candles; and in a clothing factory an illumination intensity of 1·4 foot-candles with dark material was regarded as inadequate.

For "detective" work, the standard of illumination intensity is very much lower, and is to be regarded as "general" rather than "local" lighting. Compared with the other class, the area served by each unit is very extensive; and the difference between maximum and minimum illumination is correspondingly great.

Glare.—In regard to glare effects, the lighting arrangements are often far from satisfactory; and this is the more remarkable since, apart from the discomfort caused, the fault could generally be remedied without any difficulty. Whenever the sources of light are placed in front of the workers, glare effects should be avoided, either by the use of a suitable shade, shielding the whole of the incandescent substance from the eye, or by raising the source to a suitable height.

Glare is often very pronounced in composing-rooms. In these the illuminated area is situated vertically below the source. The latter, therefore, cannot be raised without the sacrifice of some of the light. But with the modern intense systems of lighting, there is usually plenty of light that can be spared; and if an efficient reflector be used, there should be no difficulty in setting the lamp at a height sufficient to obviate discomfort. A still better method is to use a suitable shade. This should be very deep, so as to shield the whole of the light source from the eye, and made with a very obtuse vertical angle, so as to distribute the light over a wide area. Where very intense lighting is not necessary, the best position for the units is undoubtedly fairly high up, and behind and a little to the side of the worker. By this arrangement, not only is all risk of glare effects avoided, but the shadows are cast in such a direction as not to cause any inconvenience.

Shadows.—Generally speaking, the light unit serving a particular area is well arranged so that any shadow due to it is cast in the right direction—viz., not in the line between the point of sight and the eye. It often happens that a troublesome shadow is cast on the plane of work by a neighbouring unit. This is particularly noticeable in composing-rooms, where, if the lamps are not well shaded, the compositor's shadow is cast on his own cases by the unit serving the cases immediately behind him. Shadows are also sometimes observed on jacquard looms, caused by the interposition of the harness between the stretch of cloth and the light unit. Shadows are much more inconvenient when they are continually shifting than when they are stationary. In both of the above instances, they are in a state of movement—in composing, by the action of the compositor's arms and body; and in jacquard weaving, by the motion of the harness of the looms. In industries in which the work is "detective," the illumination intensity is much lower, and contrast not so marked. The question of shadows is therefore of less importance; and no instances worthy of remark were noticed.

INSPECTION OF FACTORIES AND WORKSHOPS.

Further Extracts from the Divisional Inspectors' Reports.

In the last number of the "Journal," we gave some extracts from the reports of Divisional Inspectors of Factories contained in the recently issued annual report of the Chief Inspector (Sir B. Arthur Whitelegge, M.D.). We now notice various other matters dealt with in the reports.

Mr. A. Lewis, the Superintending Inspector for the South-Western Division, says the old, and yet ever-new, subject of temperature continues to exercise to the utmost the tact, ingenuity, and powers of persuasion possessed by the Inspectors. In the Southampton district, Mr. Wolfe's greatest difficulty lies in underground places, where the use of artificial illuminants is necessary most of the day. But, on the whole, samples of air taken even here did not give very unsatisfactory results. He came across only one case of abnormally high temperature, and none below the reasonable minimum. Electric-radiators are but little used as compared with gas appliances for heating. Mr. Cook (Southampton) and other Inspectors refer to a method in use for heating small workrooms—viz., the impinging of a bunsen burner flame against a flat-iron plate, thus necessitating ventilation for the removal of the fumes. Mr. Cook reports at considerable length upon the risk of gassing at purifiers in gas-works during the work of emptying and recharging. In the course of his inquiries, he found that water-lutes for covers were general, and that oxide alone, oxide and lime, and lime alone, are used as purifying substances. The process is generally carried on in the daytime, so that no artificial lights of any kind are necessary. Various methods are adopted in order to remove any residual gas. Mr. Edwards and Mr. Price (Cardiff) also refer to purifier-houses, and recommend the hurdle method of recharging, as rendering unnecessary the use of picks, with the attendant danger of sparking.

Mr. J. H. Walmsley, reporting upon the Midland Division, says Mr. Pendock (Derby) is more than ever convinced that "gassing" is of comparatively frequent occurrence in such places as gas-works, blast-furnaces, and large pipe foundries. Quite recently he was informed of four men who in one day were rendered insensible in a gas-works, and who were only brought round by artificial respiration after the aid of a doctor had been called in. As in most cases the men recover sufficiently to resume work before the expiration of the next day, there is no "reportable accident,"

and therefore no requirement to enter such an occurrence in the general register. On the other side of the question, there can be no doubt, he thinks, that the growth of the "first aid" movement in all works of importance is bearing fruit of a commendable and useful kind; and "much needless suffering is saved by the prompt action of men trained in ambulance work."

In the report of the Superintending Inspector for the North-Eastern Division (Mr. J. A. Hine), reference is made to a report by Mr. J. M. Arbuckle, of Sheffield, on the subject of an explosion of a gas-washing tank filled with ammoniacal liquor, which occurred in some gas-works. He attributes the cause to spontaneous combustion by the chemical action of oxide of iron, naphthalene, and tar accumulating inside the tank. Mr. G. S. Taylor describes an explosion which took place in a stream passing under several factories in Bradford. He writes: "The inquiry has disclosed that one volume of petrol vapour mixed with 55 volumes of air will produce a maximum explosive effect. The experts engaged in the inquiry agree that 25 gallons of petrol in the shape of vapour were present in the affected area, and that by some means, at present unknown, it was ignited. The surface of the stream being covered with a thin layer of petrol enabled the flame to run up stream, and thus cause three different explosions, at intervals of about one minute, and at points where the fumes were more or less confined. These explosions caused extensive damage to several factory premises and to the roadway between the factories, and resulted in three persons being killed and 39 others, all employed in the factories, suffering minor injuries. The experts are further of opinion that it was not sewer gas, coal gas, carbon bisulphide, acetylene gas, nor coal-tar benzol that was the cause of the explosion." At the inquest a verdict was returned to the effect that the explosion was due to petrol vapours; but how, or by what means, or from what source the petrol got into the beck, and whether accidental or otherwise, the evidence was not sufficient to show.

Mr. Gerald Bellhouse, reporting on the North-Western Division, says inquiries have been made in all districts as to how far the precautions indicated in the report of the Inspector for Dangerous Trades (Mr. W. S. Smith), an extract from which was given last week (p. 37), are observed. He points out that both Mr. Kellett (Preston) and Mr. Eva (Liverpool) state that there is not the same risk where bog iron ore is used instead of artificial ferric oxide; the reasons being greater activity of the latter in re-oxidizing, and that it is diluted with sawdust—a more inflammable substance than the peat which answers the same purpose in the bog iron ore. Mr. Ireland (Stockport) mentions two cases of fires at purifiers—one due to the ignition of an explosive mixture of gas and air between the bottom of the purifier and the lowest layer of oxide, by a spark generated by a pick; the other was due to spontaneous combustion during the hot weather last August.

In the course of his report, to which reference has already been made, the Inspector for Dangerous Trades says attention has been directed to the dusty condition of elevator chambers in some gas-works. No explosions have been noted, though naked gas-jets are often used to light the chambers. He remarks that probably the dust in the atmosphere is insufficient in quantity or too damp to propagate a flame and explode. The danger of using naked lights in such places is, however, strongly urged.

The Medical Inspector (Dr. Thomas M. Legge) deals in his report with the effect of fumes and gases. He states that among the cases of gassing due to blast-furnace gas, six of the men were engaged charging the cupola, and at least seven in cleaning and repairing furnaces, flues, or valves. Of the 31 cases due to producer gas of one kind or another, four were due to charging or blowing out, eight to cleaning or repairing the engine or plant, six to escapes of gas (sometimes into rooms at a considerable distance) from defective valves or water-seals, and eight from the use of gas-irons—the gas being supplied from a producer-gas plant; while at least eight others suffered and recovered within 24 hours. Five cases of carbonic oxide poisoning occurred in shipbuilding from the fumes of the stoves for heating rivets. In one factory where a number of tailors' pressing-irons were used, to reduce expense in the consumption of gas a producer-gas apparatus was installed, followed by constant complaints—and indeed strikes—because of an unendurable sulphurous atmosphere causing headache, coughing, dryness of throat, vomiting, tremors, and faintness. Official report was requested of all cases in which persons were taken so ill as to necessitate absence from work. When all leaks in the gas-main, which ran at the top of the pressing-room, were stopped, there was no further trouble. A very unsuspected cause of one fatal case, and temporary unconsciousness in two rescuers, was investigated by Mr. Owner (Hull). Compressed air was used at times to discharge liquor in a tar-distilling works from old boilers in which matter was stored. Some of this compressed air came from the exhaust of the gas-engine, and on a workman entering the boiler he succumbed. In a case investigated by Mr. Bennett (Sheffield), a gas producer had been opened up to cool and ventilate for three weeks before the branch flue, 6 ft. by 3 ft. in section, was entered. The man was unconscious for some six minutes before the Pulmotor oxygen apparatus (through which the lungs are automatically deflated and inflated with air mixed with oxygen alternately) brought him round.

The Glastonbury Corporation have retained Messrs. Handcock and Dykes, of Westminster, to report to them on the advisability of applying for an Electric Lighting Order with a view to combining the supply of electricity with that of gas.

GERMAN GAS AND WATER ASSOCIATION.

Annual Report for the Year 1911-12.

The following is a summary of the contents of the annual report of the Council of the German Association of Gas and Water Engineers for the past year, which was presented at the meeting held in Munich last month.

It is pointed out that the annual report of the Council of the Association year by year gives an account of the work which has been accomplished by the Council and the Technical Committees appointed by the Association. Expression of the extent of the work undertaken by these Committees, &c., is also found in the annual accounts, which show that the expenditure tends to increase every year in respect of the technical work carried out. During the last ten years, this expenditure has included prizes for artistic gas-fittings, experiments on the lighting of school-rooms and drawing offices, the foundation and support of schools for gas-fitters, the foundation of the Instructional and Experimental Gas-Works of the Association, participation in the Municipal Exhibition at Dresden in 1903, in the Exhibition of Hygiene and Demography at Berlin in 1908, propaganda against the Gas Tax of 1909, exhaustive work on prescriptions for the avoidance of electrolysis, and prescriptions for the carrying out of fitting work. All these matters have doubtless been of far-reaching importance in advancing the industries with which the Association is associated. But they have involved very high pecuniary obligations. To these temporary or short-period expenditures, there have been added in recent years a number of outgoings of a more or less continuous or permanent character, which, however, are necessary for the advancement of the industries. These outgoings include contributions to the Association for Water Supply and Sewage Disposal, to the German Museum at Munich, and to the Central Organization for Promoting Gas Sales. The valuable statistical compilations issued by the Association also involve an annual expenditure of some £300 to £400.

The receipts of the Association are no longer adequate to meet these many claims on it; and consequently steps must be taken to provide the wherewithal to continue the more pressing investigations. While the claims on the Association have been steadily rising, the contributions of members have remained practically unchanged since the Association was first started. At last year's meeting it was mentioned that some increase in the contributions would be necessary. The Council, therefore, will propose at this year's meeting a raising of the contribution payable by corporative and extraordinary members to 40 marks (£2) per annum. The Council are unanimously of opinion that the personal members who afford valuable support by co-operation in the Association's efforts should not be called upon to pay more than hitherto. On the other hand, the corporative members—such as corporations, boards, public authorities, &c.—who primarily benefit by the results of the work of the Association, should be required to provide the additional means requisite for the free continuance of the work of the Association. The former Associates of the Association will become Extraordinary Members; and it is expected that the increase of contribution will in their case be justified also.

The benefits accruing from membership cannot be entirely expressed in monetary value; but it is pointed out that the "Proceedings" of the annual meetings form volumes of 500 to 750 pages, and contain, in addition to the papers and discussions thereon, the very valuable reports of the Technical Committees. Their value as publications must be put at 5s. at least. The Statistics of Gas-Works, which are published annually, have this year been greatly extended, and now include 425 works, forming a very valuable compilation for those interested in the gas industry [see "Journal," Vol. CXVIII., p. 355]. The Statistics of Water-Works are similarly valuable to the water engineer. Each of the publications must be valued at 5s. per annum at least. Further, members receive post-free, at a reduction of 4s. per annum on the ordinary subscription prices, the official organ of the Association ("Journal für Gasbeleuchtung"). The value of the publications only thus exceeds the previous subscription for members. On this account alone, the proposal for raising the subscription is more than justified.

Another change which time has wrought in the life of the Association will come before the annual meeting—viz., that some of the Technical Committees, to which members have devoted great personal attention, have completed the work for which they were appointed, and will be dissolved. When new questions arise, fresh Committees will be appointed. Thanks are extended to the members of the Committees which are thus being dissolved. These Committees include the Instructional Committee, who completed their work last year; the Gasholder Standards Committee, who last year reported that the questions referred to them had been dealt with, their standards having been published in the year 1903; the Committee for the German Museum, which is now well-established on an independent basis; the Committee for Electrolysis, and the Heating Committee, both of which report this year that their work has been brought to an end. The completion of one important piece of work of the Association has been delayed—viz., the issue of prescriptions for fitting work in connection with water supplies. The question of these prescriptions has been referred to the District Associations; but the discussion of the details has been very protracted, and the anticipation that a

draft of the prescriptions would be ready for presentation at this year's meeting at Munich has not been fulfilled. The Standards Committee, under the chairmanship of Sir William Lindley, have, in conjunction with represesentatives of tube and fitting makers, continued their work on the International Standardization of Screw-Threads in accordance with the decision of the Conference held at Paris in 1911. The Committee have been in communication with the Swiss representatives; and by practical trials at an iron and steel works at Schaffhausen, they have collected valuable material to settle the points remaining open.

The Photometric Committee have considered with the Council the resolutions of the International Photometric Commission at Zürich last year, and a communication from the Illuminating Engineering Society of New York, which proposed an International Conference for settling photometric units and uniform nomenclature for photometric quantities. The Association was able to fall in with the resolutions of the Zürich conference in regard to the number of the representatives of the different countries and the apportionment of the contributions. The purpose of the proposed admission of electro-technical members to the International Committee is to make the Committee competent to establish international agreements as to photometric units. But the Commission was originally established for the study of the photometry of incandescent lighting, and was therefore a Gas Photometric Commission. The addition to it of a minority of electro-technical representatives cannot be, in the opinion of the Council and the Photometric Committee of the Association, purely consistent with this object. It was thought better to endeavour, with the co-operation of the Association of German Electricians and the Physical-Technical Reichsanstalt, to constitute a special International Commission which should deal with the general principles of photometry, and in particular with the decisions arrived at at Zürich in 1905 on photometric units. Negotiations for the organization of such a general International Photometric Commission are in progress. It has been further decided to constitute a Sub-Committee under the chairmanship of Dr. Eitner, to carry out further photometric research work.

The Committee for the Working of Water-Works have laid before the Council a petition to the Prussian Minister of Agriculture and Lands with reference to the Bill published last autumn for a proposed new water law. The Council transmitted this petition to the Ministry on March 16, and members of the House of Representatives were informed of it. The petition, following the lines of that presented in 1908, asked that the Legislature should give full consideration to the wishes of the Association in respect of the problem of the disposal of sewage, and the question of underground water. The Committee record their thanks to the Chairman, Herr Reese, for the quick and practical manner in which he dealt with this important matter.

The Instructional and Experimental Works is able to report another year of useful work. It has brought its systematic investigations of coal to a definite conclusion, and has in preparation a comprehensive report thereon. It is now making exhaustive researches into apparatus for the use of gas. In a supplement to its report, further experiences of electrolysis are reported.

The Council held a meeting at Düsseldorf on Oct. 21, at which the Bunsen-Pettenkofer Memorial Medal of Honour was presented to Herr F. Reese, of Dortmund. The medal was also presented, on Dec. 25 last, to Herr Reichard, of Carlsruhe, by Professor H. Bunte and the General Secretary (Dr. K. Bunte) on behalf of the Association. The Diploma of Honorary Membership was presented to Sir William Lindley by Professor Hoffacker, of Carlsruhe. On March 29 and 30, the Council met in Berlin. Meetings of the Gas-Meter Committee, the Photometry Committee, the Committee for the Instructional and Experimental Gas-Works, the Committee for the Simon-Schiele Foundation, and the Council of the Benevolent Fund were all held at the same time. The Association were represented by the President, Herr Kordt, at a discussion on the duty on oil at the Imperial Treasury on Nov. 24. For the time being, the Association are in a neutral position in regard to this question. While a reduction or abolition of the import duty on oil is desirable for the manufacture of carburetted water gas, the duty serves the purpose of advancing the employment of tar oils and thin crude tars as fuel for Diesel engines. The cheapening of crude oil which would follow a removal of the import duty would bring this employment of tar to a standstill. The discussion of the question of the duty on oil has resolved itself largely into a tussle between those interested in the manufacture of Diesel engines and those interested in the manufacture of tar oils.

The Association were represented by Herr Schimming at a discussion on employment agreements arranged by the Association of German Engineers on Nov. 23. The discussion was only of a preliminary character. A Committee, on which the Council are represented, have been formed with the object of preventing technical schools being founded on lines which do not conform with technical requirements. A petition on the subject presented to the Prussian Minister of Commerce and Industry has been favourably received. The Association of German Engineers have also established a Committee to resist objectionable bye-laws made by local authorities; and Mr. E. Körting, of Berlin, and Herr Tremus, of Lichtenberg, have been nominated to represent the Association on this Committee.

The Committee for the Working of Gas-Works have not held any meeting during the past year, but have dealt with several questions by circular letters to individual members. The chief work of the Committee has been the compilation of the gas statistics. Various points in connection with these statistics have been discussed, and it has been decided in the next issue to include particulars as to the source of the coal used on the different works. The statistics now refer to 425 gas-works, and are otherwise more comprehensive than hitherto.

The membership of the Association has increased by 24 in the course of the past year. It now comprises 5 honorary members, 932 members, and 221 associates. The reports of the eight District Associations affiliated with the Association are included in the report. The more important particulars given in these reports are as follows:

The Brandenburg Association of Gas and Water Engineers held their thirty-third annual meeting on April 13 to 15 last in Berlin. The Association comprises 1 honorary member and 201 members. The President is Herr Pfudel, of Charlottenburg. A number of interesting papers were read at the annual meeting, and various works were visited. [See "JOURNAL," Vol. CXVIII., p. 161.]

The Mid-Rhenish Gas and Water Engineers' Association held their forty-eighth annual general meeting on Sept. 23 to 25, at Baden-Baden. A number of papers were read at the meeting, which was under the chairmanship of Herr Frahm, of Baden-Baden. The membership comprised 7 honorary members, 117 ordinary members, and 152 associates.

The Association of Gas and Water Engineers of Silesia and Lausitz held their forty-third annual general meeting on Aug. 24 to 26, at Schweidnitz, under the chairmanship of Herr F. Goerisch of that town. The Association comprises 2 honorary members and 165 members. Several interesting papers were presented at the annual meeting.

The Association of Gas, Electricity, and Water Engineers of the Rhine District and Westphalia held two meetings during the course of the year. The first was at Ems on Sept. 16, when a number of papers were read and discussed. The second meeting was held on Feb. 3 at Crefeld. The Association at the close of the year comprised 2 honorary members, 234 ordinary members, and 130 extraordinary members.

The Bavarian Association of Gas and Water Engineers held their twenty-seventh annual general meeting on April 27, at Aschaffenburg, under the presidency of Herr R. Terhaerst, of Nuremberg. There were at the close of the year 86 members and 85 associates. A number of interesting papers were presented at the meeting. [See "JOURNAL," Vol. CXVIII., p. 157.]

The Baltic Association of Gas and Water Engineers held their thirty-ninth annual general meeting from Aug. 30 to Sept. 2 last, at Hohensalza, under the chairmanship of Herr Harder of that town. The Association at present comprises 166 members of all classes.

The Association of Gas and Water Engineers of Saxony-Thuringia held their fifty-ninth annual general meeting on Aprll 25 to 27, at Plauen, under the chairmanship of Herr Martin, of Erfurt. The Association at the close of the year comprised 109 members and 77 associates. Many interesting papers were read and discussed. [See "JOURNAL," Vol. CXVIII., p. 232.]

The Association of Gas and Water Engineers of Lower Saxony held their thirteenth annual general meeting on Sept. 28 to 30 last, at Osnabrück, under the presidency of Herr Hase, of Lübeck. The membership now amounts to 169. A number of technical communications were presented and discussed at the meeting; and the local gas and electricity works were inspected. [See "JOURNAL," Vol. CXVI., p. 243.]

The report contains a list of contributors to the Scientific Purposes Fund of the Association; also the statement of the Committee of Management of the Schiele Foundation, which shows that payments were made during the year to seven engineering students for the expenses of travelling courses for study. The statement of the position of the Benevolent Fund of the Association follows. It appears therefrom that assistance has been given in the course of the year to 32 families or persons, and that the sum distributed among them was about £480.

The accounts for the year show receipts amounting to 52,849 marks (about £2630) and expenditure amounting to 47,526 marks (about £2330).

Second Census of Production.

It is officially announced that the second census of production under the Census of Production Act, 1906, will be taken in 1913 in respect of production carried on in the present year. The schedules to be issued to manufacturers and others for the purpose of the census cover in the main the same ground as those for the first census. The instructions have been simplified, and the majority of the schedules have been reduced from eight pages to four pages of somewhat larger size. By arrangement with the Home Office, the particulars of the numbers of persons employed will also serve as the ordinary return required for 1912 under section 130 of the Factory Act; and manufacturers will thus be saved the trouble of making two separate returns. At the present time, the schedules are being issued in draft to Chambers of Commerce and Trade Associations in order to afford them an opportunity for the consideration of the details of the information required before these are finally settled. We have received the one relating to gas-works undertakings. The schedules on which manufacturers will be required to make their returns will not be sent out until the beginning of next year.

HEATING BY RADIATION.

By M. Lucien Bertin.

[Abstract of a Paper submitted to the Société Technique.]

M. Bertin in his paper discusses in a very useful way the question of radiant heat obtainable from luminous and bunsen flames, and from incandescent bodies heated by means of these flames. He also summarizes the results obtained by various experimenters on the subject, and draws particular attention to the work carried out by the Gas-Heating Research Committee of the Institution of Gas Engineers.

M. Guéguen has shown that the amount of heat radiated from bunsen flames is only about 71 per cent. of that radiated from luminous flames—the gas rate being the same in both cases. The author repeated these experiments, and found that the relative quantities of heat radiated from luminous and non-luminous flames of the same gas are as 2 : 1·5. Mr. E. W. Smith obtained the following results, using a Bray slit batswing burner:—

Gas Consumption at 30 in. Bar. and 60° Fahr. (wet).	Net Calorific Value of Gas at 30 in. Bar. and 60° Fahr. (wet).	Percentage of Heat Radiated.
10·55	141·0	18·12
10·1	132·3	18·15

In gas-fires, better results than these are obtained.

Luminous flames have been employed for heating rooms; the appliances used since 1806 providing both heat and illumination. This principle is found in the reflector stoves first introduced by Jacquet, and still used largely in Germany. Clark's syphon stove also contains a luminous flame, which is surrounded by a glass chimney. Roasters and grillers used in France, particularly those out on hire, have until recently contained luminous flames.

So far as bunsen flames are concerned, Von Helmholtz has shown (1890) that the percentage of radiant energy emitted from them only amounts to 5 per cent. of the total energy evolved. Callendar, with a Méker burner, found 15·20 per cent.; and Mr. E. W. Smith found 12·25 to 15·2 per cent.—the results depending upon the size of the flame and the extent to which it is aërated. The larger the flame and the less the aëration, the greater the percentage of heat radiated. Attempts have been made ever since the introduction of coal gas to obtain hotter flames; and it was left to Bunsen, in 1855, to show how, with his atmospheric burner, gas might be used with advantage in heating appliances.

Thomas Fletcher was one of the pioneers in the development of the atmospheric burner; and since 1900 the use of these burners in conjunction with various refractory materials employed as radiating media has been the subject of important experimental work in England, especially in connection with gas-fires. The chief aim of the manufacturer of the modern gas-fire has been to increase the percentage of heat radiated. He has paid very little attention to the question of conduction and convection, and has not attempted to make use of the heat carried away by the products of combustion. This is because heating by radiation is believed to be pleasanter and more effective.

The old way was to heat the air; and the occupants of the room derived their warmth from it. But the air became drier and less healthy. In the new way, the occupants are warmed by direct heat from a radiant body; the air remaining fresh and fit to breathe. M. Bertin suggests that the heating of apartments by hot air is more economical; but this statement will perhaps not meet with general acceptance. He agrees that, even from the modern gas-fire, there is a fair percentage of convected heat obtainable—due to the flow of air over the heated surface of the castings. The proportion of radiant energy emitted from a modern gas-fire is about 50 per cent., and the effective efficiency—radiant and convective—is about 80 per cent.

Though the methods which have been proposed for measuring radiant energy are numerous, they may here be grouped under three heads: (1) Those in which differential thermometers having blackened bulbs are used. (2) Those in which the radiant heat is absorbed by means of blackened copper calorimeters containing water, such as the spherical calorimeter of Lévy. (3) Those in which the thermopile or the bolometer plays a part. The former instrument consists of a number of thermo-couples, by means of which an electromotive force is obtained in proportion to the degree of radiant energy absorbed by them. This is measured on a galvanometer. In the bolometer, advantage is taken of the fact that the resistance of a metallic wire varies with the temperature. The first of these methods is not accurate; the second, in the form proposed by M. Lecomte, does not permit of continuous measurement; and the bolometer is too sensitive to prove of practical utility. The thermopile lends itself very well to rapid measurements; and it has been used in England in conjunction with a continuous circulation calorimeter in connection with work of much importance on heating by radiation.

In England, Mr. J. H. Brearley, in 1907, by means of a Rubens thermopile, obtained figures from which he constructed a polar curve of the horizontal radiations. The Gas-Heating Research Committee formed in 1907 by the Institution of Gas Engineers, working in conjunction with the University of Leeds, determined by means of a thermopile the radiant heat falling on the surface of animaginary hemisphere with its centre at the centre of the fire. The figures obtained were translated into calories by bringing into use a circulation calorimeter, and the total percentage heat radiated was calculated.

Mr. J. G. Clark used a calorimeter constructed in the form of a segment of a cylinder. He abandoned the thermopile. The method is simple; but it has the defect that it neglects all the heat rays passing above the top and foot of the apparatus. Mr. Clark and Mr. Smith (of the Gas-Heating Research Committee) eliminated the errors which might be due to the convected heat of the room, by running blank tests while the apparatus was not exposed to the head radiation. Mr. John Bond has developed a thermo-electric method. He has arranged a number of thermo-couples on a semicircular frame adjustable round a vertical or horizontal axis. From the figures he obtains he constructs polar curves showing the hemispherical radiations; and he calibrates these against the radiations emitted from a surface of known temperature radiating 1000 B.Th.U. per hour.

Mr. Smith's method, developed at Leeds, appeared to M. Bertin to be the one of the most practical application. Having only the account of this work as published in the Technical Press, the author worked out the details for himself, and obtained results which corresponded very well with those arrived at by Mr. Smith; and where others were obtained, they were easily explainable.

In his method of applying the Research Committee's method, M. Bertin made a few slight alterations. The Leeds method is described very fully in the paper. It will be remembered that the radius of the imaginary sphere upon which the radiations were supposed to fall was 34·4 inches. M. Bertin finds 1 metre (39·37 inches) to be a more convenient number to work with. The calorimeter used (called a "radiometer" in the Leeds report) was of the same area as the centre square in the imaginary hemisphere, and was 34·8 inches square.

The radiometer M. Bertin used was the same in principle as that designed by Professor R. H. Smith (as used at Leeds); but he added a number of refinements which he considered necessary. He caused the water to enter the calorimeter at a temperature 4° C. below that of the experiment room, and leave it at about 4° C. above it. In this way, a degree of possible error might be avoided. In the Leeds experiments, the room being small for the purpose, though the inlet temperature of the water was always lower than that of the room, the outlet temperature was likewise lower. As blank tests were always run, this did not constitute a source of appreciable error in the Leeds method. The author did not include in his investigations a determination of the amount of ventilation brought about by the aid of the gas-fire; but he expresses the opinion that the ventilation will, among other factors, vary with the type of fire used. The results he obtained for the percentage heat radiated from various fires accorded well with those published by the Gas-Heating Research Committee in 1909-10.

The following table shows the results obtained with different fires, using various radiating materials:—

—	Radiating Surface, Square Centimetres.	Gas Consumption in Litres per Hour.	Net Calorific Value per Cubic Metre.	Calories Consumed per Hour.	Calories Radiated per Hour.	Percentage of Heat Radiated.
No. 1.	..	740·0	4607	3409·0	1309·0	38·39
,, 2.	306	642·6	4572	..	1570·2	53·45
,, 3.	420	520·6	4862	2531·0	610 2	24·11
	420	777·8	4545	3535·2	.	31·33
	740	1029·6	4505	4638·0	1568·6	33·81
,, 4.	300	689·8	4610	3680·0	1168·8	36·78
	418	491·0	4862	2384·0	924·6	38·73
,, 5.	500	519·0	4483	2327·4	967·5	41·74
	720	773·0	4588	3546 4	1659·4	46·50
,, 6.	120	227 0	4614	1047·2	512·4	48·89

Fires tested: 1. Luminous flames, reflector. 2. Bunsen flames, iron frets. 3. Bunsen flames, asbestos fuel. 4. Bunsen flames, refractory fuel in balls. 5. Columnar fuel. 6. Bar fuel.

M. Bertin cannot, for obvious reasons, specify in detail which fires he tested, but he makes a few general remarks on each one.

No. 1.—This was a German reflector stove heated with luminous flames, and having a system of recuperation. The reflector was large and made of polished copper. All the heat is thrown in the front and towards the floor. The English reflector gives 22 per cent. better results than these (Körting).

No. 2.—Mr. Thomas Fletcher always preferred iron frets. These are of very little use, as they give rise to unpleasant smell on lighting up.

No. 3.—Asbestos fuel is inefficient as a radiator, even when the same flame temperature is maintained.

No. 4.—Fire-clay fuel in the form of balls used to be arranged behind iron guards over the bunsens anyhow, but manufacturers in England have recently adopted columnar fuel fitted to the flames, and abolished the iron grating. Clamond first showed the importance of flame temperature in this connection. The Gas-Heating Research Committee made a close study of the effect of composition in the fire-clay materials.

M. Bertin, from his experiments on reflector stoves, comes to the conclusion that there is an increase of from 2·4 to 6·6 per cent. in the useful amount of heat radiated by the use of reflectors. Mr. E. W. Smith found that the total heat radiated when using an inclined reflector at the foot of the stove was not affected appreciably. The author agrees with Mr. Forshaw when he states that for the same volume of gas burnt the efficiencies rise (up to a

point) with the increase in pressure; the resultant flames being smaller but hotter.

The direction in which the heat is radiated is a matter of importance. It is pointed out that a fire having a total radiation of 29·84 per cent. is almost as useful as one radiating 41·74 per cent., if the former radiates 24·49 per cent. of its heat above the floor of the apartment while the latter only radiates 26·53 per cent. in the same direction.

For the same volume of gas burnt, the higher the pressure of the gas, the better the result generally speaking. The volume of air injected is greater, and a smaller and hotter flame is produced. The temperature of the radiating material is consequently increased; and even though these bodies do not fall in quite with Stéfan's law, there seems little question that the amount of heat radiated increases more quickly than the rise in temperature.

The following results are given for a fire with fire-clay fuel:

Pressure. Millimetres.	Heat Radiated. Per Cent.	Pressure. Millimetres.	Heat Radiated. Per Cent
30 ..	23·6	70 ..	30·29
50 ..	29·84	100 ..	37·36

For a fire fitted with asbestos fuel and the pressure varying between 30 and 100 mm., the percentage radiation increases from 18·43 to 34·33.

The volume of gas burnt in a fire also controls the radiation efficiency. The greater the consumption, the higher (to a point) will be the efficiency. This maximum point will vary with the fire under test. When this is passed, the efficiency will drop.

Gas Consumption per Hour in Litres, at 0° C. and 760 mm., and at 50 mm. Pressure.	Heat Radiated. Per Cent.	Gas Consumption per Hour in Litres, at 0° C and 760 mm., and at 50 mm. Pressure.	Heat Radiated. Per Cent.
481·4 ..	34·88	556·8 ..	29·84
514·6 ..	30·43	617·8 ..	27·81

Iron grids in front of the radiating fuel have a detrimental effect on the efficiency of the fire. The author found that with the same fire he could obtain an efficiency of 45·77 per cent. when no grating was used, whereas the maximum obtainable with a grating was only 35·61 per cent. In the case of a fire having a total radiation efficiency of 41·51 per cent. with the fuels in place, the efficiency fell to 17·19 per cent., or 41 per cent. of the total heat radiated, when the fuels were removed.

Determinations were made of the temperatures (in degrees Centigrade) attained by different fuels; the pressure (2 inches of water) and consumption remaining constant: Iron fuels, 1350; fire-clay balls, 1250 to 1300; Clamond bars, 1350; columnar fuel, 1200; asbestos fuel, 1250 to 1280. The maximum temperature obtained in the flames is given from 25° to 50° higher than these figures.

M. Bertin showed that there was very little relationship between the temperature of the products and the radiation efficiency. The temperature of the products leaving the fuels depends on the nature of the fuel. The pull of the flue will also adversely affect the temperature of the fuels.*

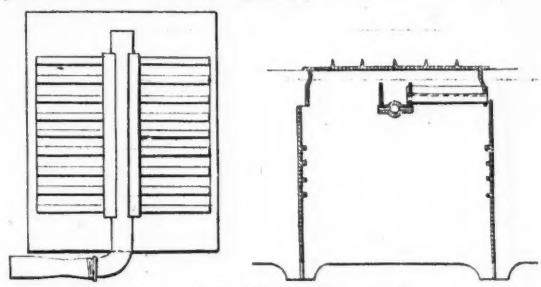
The Kern radiators are too delicate to adjust; and because their efficiency depends on the high percentage of air in the mixture (4·3 to 5·8 volumes of air to 1 volume of gas), they are not always quiet. They are very sensitive to changes of pressure and density, and require much attention before they give the best results. They have, however, the advantage of giving complete combustion.

M. Clamond has devised a fuel which is constructed of better radiating material than the Kern tube, and will consequently give a better radiation effect at a lower temperature. This makes possible the use of a partially aërated flame. It is, of course, cooler, but almost noiseless. The material has a low heat conductivity. This fuel is produced by making a paste of clay and some finely-ground carbon or coke, which is partially dried and pressed into the required shape. It is then completely dried and baked at 1200° C. A highly porous material is thus obtained; the carbon having been burnt off. These fuels have been fitted to a large number of heating appliances. M. Clamond has also devised a portable fire containing these fuels, to replace the old five-tube radiator. There are two rows of fire-clay bars, on which play a row of small flames. The bars are not placed over the flames, but against them.

An extensive series of tests have been carried out with fuels containing varying proportions of clay and carbon—*i.e.*, bars of varying porosity; and very different results have been obtained. As much as an increase of 28·62 per cent. in radiation efficiency was found with a fuel of maximum porosity. The mean total efficiency of such a fire is about 45·7 per cent.; this result standing next to those obtained with iron fuels. The fire is free from oxidation and smell; and the appearance is improved. In the Clamond fire, better results are obtained at low than at high pressures; the gas consumption remaining constant. With a pressure of 30 mm., the percentage efficiency was 49·55; with 50 mm., 47·77; and with 100 mm., 46·49.

These results appear to contradict previous statements in the paper; but, on examination, it will be found that the position is tenable. There are two very different sets of conditions. In the first case, the efficiency depended upon the temperature of the flame; and this depended upon the volume of primary air, which depended upon the pressure of the gas. But as the temperature was raised, the flame decreased in size, and the area of incandescence was reduced. In the Clamond type, the flames are larger for the same consumption of gas; and as it is possible to obtain high radiation from low temperature heating, because of the nature of the fuels, good results are being realized over a larger incandescent area. The temperature is raised locally, due to the high porosity of the material. As the flames in the Clamond fires are exposed to the atmosphere, and obstructed by the fuels, it was important to determine what volume of carbon monoxide was present in the products. Professor Ogier found from his tests that there were no appreciable traces of carbonic oxide present in the products.

M. Bertin gives a lengthy description of a new type of griller and roaster supplied by the "Société Française de Chaleur et Lumière." The special feature of this griller consists of what are termed "*barreaux réfractaires*"—*i.e.*, fire-clay bars of great porosity, as before described—which are fitted on each side of a bunsen burner, in two layers, one above the other. The following plan and section show the bars in position.



A New Type of French Gas-Griller.

It was shown from a number of tests that the radiant efficiencies of the white flame and the bunsen flame, playing on cast iron frets, asbestos, and various kinds of fire-clay tops, are not so satisfactory as the refractory bars, which give as radiant heat more than 33 per cent. of the total heat units in the gas burnt; whereas white-flame roasters give 19 per cent., blue flame with fire-brick top (an English make) 21·94, asbestos 25·36, metallic top (French make) 26·91.

In carrying out the following experiments, M. Bertin endeavoured to establish a practical method for the comparative efficiencies of grillers and roasters, but limiting these tests to the radiant efficiencies. The grillers were of the ordinary type, having grilling areas 250 to 260 cm. deep, 270 to 310 cm. wide, and varying heights. These were divided into two distinct types—viz., luminous and bunsen flames; the former not presenting such a variety in design as the latter. The bunsen-burner types were usually fitted with one or two "poker" burners, the flames from which played on a fire-brick, asbestos, or cast-iron top.

Four tests were carried out in succession—the first three by means of circulation, evaporation, and the thermopile; and M. Bertin describes the fourth method as the calorimetric test, which he considers more accurate than the other three.

Circulation or Thermo-Syphon Method.—A copper boiler of suitable dimensions was inserted underneath the griller, where the meat is placed; the boiler being connected to an expansion tank with the usual flow and return pipes. Periodical readings were taken until the temperature of the water reached 99° C.; the gas consumed per minute and in total being recorded. The waste heat rising from the top of the griller was measured by placing a vessel over the griller and measuring the temperature of the water in it, in conformity with the time and other conditions of the test. M. Bertin does not consider it easy to determine the utilization of the heat units to any degree of accuracy with this system.

—	Griller with Central Luminous Burner.	Griller with Bunsen Burner and Metal Deflector.	Griller with Fire-Clay Bars.
Consumption per minute, litres .	10·41	9·20	7·25
Time taken to obtain 99° C. . .	36′15″	29′58″	27′50″
Total consumption, litres . . .	377·35	275·67	201·21

Evaporation Method.—The radiant energy of the grill is determined by weighing the water evaporated in a certain time, or the

Comparison of Two Grills.

—	Griller with Bunsen Flame and Metallic Deflector.	Griller with Fire-Clay Bars.
Gas consumed per minute.	9·20 litres	7·35 litres
Do. in 30 minutes	276·00 ,,	220·50 ,,
Weight of water evaporated	466·00 grms.	464·00 grms.
Do. per litre of gas consumed	1·68 ,,	2·09 ,,

Calorific value of gas, about 4955; pressure, 50 mm.; initial temperature of water, 17° C. Time taken for test, 30 minutes.

* See paper by Mr. E. W. Browning, on "Gas-Fires and Chimney Flues," in the "JOURNAL," for Jan. 31, 1911.

time taken to evaporate completely a given quantity of water. On the dish of a balance is placed a flat vessel containing the water; this vessel being inserted underneath the griller, and the balance being maintained by placing a number of small lead weights on the other dish. As the water evaporates, weights have to be taken off equal to the weight of water evaporated from time to time, to keep the balance even. The test may be ordered on the results of a given number of the scale adjustments.

Thermopile Method.—A thermopile is placed under the griller at a distance that will admit of the whole of the radiated surface of the grill being measured by it. Measurements may be recorded in galvanometer deflections, in millivolts per litre of gas, or in millivolts per heat unit of gas consumed during the test. The grill is placed over the opening of a box construction, and the radiating grill-plate is so placed that the thermopile in the box is directly under the centre of the grill, and thus measures the radiant energy at a determined distance from the grill-plate to the centre of the thermopile. Tests were made at various distances; but 0·82 metre was the minimum at which the thermopile focussed the whole of the grilling-plate. In the following table are given the results from six different types of grillers:—

Gas Pressure.	50 mm.		80 mm.	
Distance of thermopile from griller .	0·82 m.	1 m.	0·82 m.	1 m.
Calorific value of gas	4188	4512	4581	4444
Grillers.	Calories per Millivolts.			
White flame with central burner . .	767	791	505	718
,, ,, ,, two side burners .	..	644	477	630
Blue flame with metal deflector . .	287	400	315	490
,, ,, ,, asbestos top . . .	473	576	571	671
,, ,, ,, fire-clay tubes . . .	407	333	408	324
,, ,, ,, fire-clay bars . . .	257	219	253	..

This method has in its favour a rapid way of determining the radiant efficiency of a griller; and it is useful for comparative purposes, for which it is sufficiently correct.

Calorimetric Method.—Not having found the foregoing methods altogether satisfactory, M. Bertin proceeded to place a calorimeter under the grill. But, unlike the first-mentioned thermo-syphon method, the present one worked with a flow of water regulated by an inlet and outlet; and the upper outlet was watched until the water leaving it became of constant temperature. The particulars of this system published by the American Gas Institute in 1907, and also by M. Lauriol, of Paris, on the same subject, have brought about improvements. The water inlet is regulated to give per minute a fixed flowing quantity, which takes up a percentage of the heat units from the gas. During a given time, these are carefully measured, and the relation between the heat units taken up by the water and those of the griller established the efficiency of the latter. The temperature in the room should be constant—say, 15° C.; while the water store should be kept at 11° C. The waste products are measured by placing over the grill a vessel containing water with a copper float in it. The principle of determining the temperature of the water and its relation to the number of heat units taken up by the gas is much on the same lines as before described.

SCOTTISH JUNIOR GAS ASSOCIATION.

(EASTERN DISTRICT.)

The Annual General Meeting of the Eastern District of the Scottish Junior Gas Association was held in the Heriot-Watt College, Edinburgh, on Saturday, when Mr. J. R. Moyes, the President, presided over a good attendance of members.

Annual Report.

Mr. W. Geddes, the Hon. Secretary and Treasurer, read the report of the last annual meeting, which was held on March 18, and the minutes were adopted on the motion of Mr. Harper, seconded by Mr. Chalmers.

The Insurance Act.

Mr. H. E. Doran (Granton) opened a discussion upon the National Insurance Act, and, in the course of an exhaustive review of the principal provisions of the measure, showed its probable effect upon gas-works' employees. The question of approved societies, and the effects of a worker leaving his work voluntarily or otherwise were discussed, and cordial approval was given to the recently compiled report of the Institution of Gas Engineers on the subject of the Bill. The scheme drawn up by the Gaslight and Coke Company was also favourably mentioned.

In the course of the discussion that followed, various points were brought out as requiring further elucidation at the hands of the Chancellor of the Exchequer.

Mr. Moyes said he was under the impression that most people were at sea in regard to the ramifications of the Act and its possible effects.

Mr. Bisset (Granton) was of the opinion that the more one looked into the Act the more puzzling it became. He thought it a very ill-digested measure.

Mr. Geddes emphasized the fact that the employer's contribution in respect to the employee would have the effect either of having the employee "speeded-up" or, as was foreseen, the tendency would be to replace much manual labour by labour-saving machinery.

Mr. Doran demurred to Mr. Geddes' conclusions, and argued that new machinery did not necessarily mean a reduction in the number of people employed.

After some further expression of opinion, in the main hostile to the Bill,

Mr. Moyes remarked that, personally, he thought it would affect the working man to a very considerable extent. There would be a charge of 3d. per week against production; and in this connection he asked them to notice how within recent date the prices of goods had been going up, all on account of the extra cost imposed by the Insurance Act. The employer was bound to recoup himself for the extra expenses; and in the end, as usual, the consumer would have to pay. Then, again, the thrifty man was to be penalized on behalf of the unthrifty. He moved a cordial vote of thanks to Mr. Doran for his paper, which was unanimously agreed to.

Annual Report of Council.

Mr. Geddes read the annual report of the Council for the session 1911-12. This was signed by Mr. J. R. Moyes, and Mr. Geddes.

The report stated the total number of members on the roll at the end of the session was 98, of which 85 were ordinary and 13 honorary—a decrease of three as compared with last year. Four meetings had been held during the session—two in Edinburgh, one in Dunfermline, and one in Perth, at which interesting papers were read and discussed. In reference to changing the session from winter to summer, the report mentions that "the result of the change cannot be described, even by the most enthusiastic, as an improvement on the old system." Three works had been visited during the session. The Council remark that these outings are, as a rule, better attended than meetings. The Council record their appreciation of the uniform kindness the Association received at the hands of the various companies and corporations whose works were visited. They also express indebtedness to those honorary members who assisted the work of the Association during the past session. Thanks are accorded to Principal Laurie for the continued use of the Heriot-Watt College. Since the last report, the following members had been promoted to wider spheres of influence: Messrs. W. B. M'Lusky, David Vass, E. H. Scott, R. J. Philp, and Mr. Wilson.

The report was adopted, on the motion of Mr. J. Mitchell (Dundee), seconded by Mr. J. M'Millan (Lasswade).

Balance-Sheet.

The balance-sheet, which was also submitted by Mr. Geddes, showed that there was a balance in the Treasurer's hands of £7 14s. 11d.—the total income, including a balance of £10 18s. 9d. brought forward, being £33 3s. 9d. There were also unpaid subscriptions amounting to £3.

Change of Date of Session.

Mr. Doran moved, and Mr. J. Bisset seconded, that they go back to the old winter session.

Mr. Bisset remarked that he thought the whole of them there were of opinion that the change to the summer had not been for the benefit of the Association. They had seen that the attendance had not been so good.

Other members spoke in favour of reverting to the old arrangement, and the motion was unanimously agreed to.

Election of Office Bearers.

The following office bearers for the coming year were elected:

President—Mr. A. Bishop, of Newtongrange.
Vice-President—Mr. W. Geddes, of Granton.
Hon. Secretary and Treasurer—Mr. J. Farquhar, of Granton.
Members of Council—Messrs. J. J. Scott, of Kennoway; C. Hamilton, of Loanhead; and J. Mitchell, of Dundee.

Votes of Thanks.

Mr. Chalmers (Alva), moved a vote of thanks to Mr. Geddes for the admirable way in which he had discharged the duties of his double office.

Mr. Geddes acknowledged the compliment.

Votes of thanks were also accorded to Messrs. Harper, Cowie, and Doran—the retiring members of the Council—and to the Chairman.

Mr. Moyes reminded them that they were now getting their holidays; and it fell to them to come back in September or October, when the new session commenced, and do their best to keep the Association in the front, and to make it of mutual benefit to all connected with it.

The proceedings then terminated.

Last Wednesday evening, Mr. Lewis Bain, of the Fraserburgh Gas Department, was met by his fellow-employees and made the recipient of a handsome Gladstone bag and pipe on the occasion of his leaving to take up the management of the undertaking of the Cullen District Gas Company.

HENNEBUTTE'S TAR-DISTILLING PROCESS.*

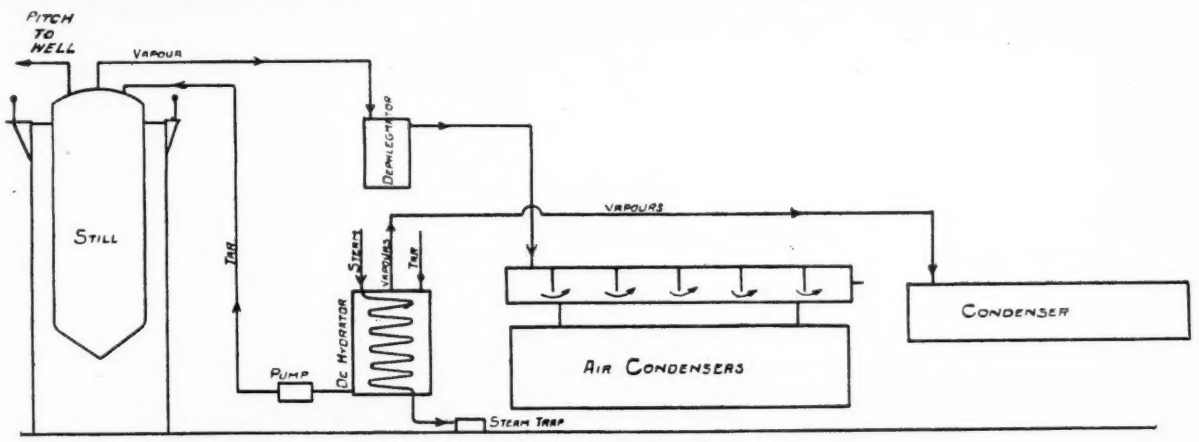
In this patented process, the distillation of the tar is effected or completed by means of the heat exothermically generated in the mass by the oxidation of the distillation products, and without fire heat. The tar, if cold, is first heated by any suitable means, and passed on into the distilling apparatus, into which air is injected under such conditions that the hydrocarbons are partially deprived of hydrogen, which combines with the oxygen of the air employed, forming water; the heat liberated in the dehydrogenation reaction being amply sufficient to supply the heat required for distillation. The temperature for treatment is sufficiently low to avoid the pyrogenous decomposition of the hydrocarbons which takes place in the usual processes, resulting in the production of carbonaceous deposits along the shell of the still, and rapid deterioration of the apparatus.

In the ordinary process, which may be termed a process of exhaustion, the necessary heat for distillation is drawn from an exterior source, and transmitted through the plates of the still. The tar is thus subjected to a progressive rise of temperature to about 350° C., so as to extract the bye-products which it contains, and obtain a residue of distillation which is solid at ordinary temperatures. Pitch of this character contains from 27 to 33 per cent. of insoluble hydrocarbons, formed especially at the period of pyrogenic decomposition—that is, at a temperature of about 300° C. From the point of view of quality, these insolubles are to pitch as ash is to fuel.

The temperature of treatment by Hennebutte's process being appreciably lower—about 100° C.—the temperature of decomposition is not attained, and the products are of higher density and entirely different molecular composition, while the residual pitch contains hardly any insoluble hydrocarbons. The fractions of distillation of a marketable value below that of pitch may, if desired, be retained in the pitch, increasing the yield of pitch from 96 to 97 per cent. on the dehydrated tar treated. The pitch may therefore be of any predetermined melting-point, which may be varied at will. Owing to the absence of insolubles in the pitch, and its complete liquefaction at the temperature usual in the mixer, it is claimed that great economy is obtainable in its use as an agglomerant for briquettes. At Noeux, in the Pas de Calais, a saving of 20 per cent. has, it is stated, been effected, as compared with ordinary pitch, for an equal degree of cohesion.

It is claimed for the Hennebutte process that it possesses the following further advantages over the usual distillation processes: The still is not subject to the rapid deterioration which forms so important an item in the cost of distillation. The production from a 30-ton still is 90 tons per 24 hours, which is far in excess of the capacity of an ordinary still. This fact, coupled with the facility with which it may be operated, reduces the cost of labour to a minimum—about 1d. only per ton of tar treated, with three stills working. The first cost of the plant is less; and the risk of fire is avoided. We are informed that the economy in fuel, labour, and maintenance claimed to be effected by the process is conclusively shown by the figures of cost.

* The patents under which this process is worked are No. 16,182 of 1905 and No. 28,689 of 1906. Abstracts of the specifications appeared in our "Register of Patents" on July 17, 1906, and Dec. 17, 1907.



General Arrangement of the Hennebutte Tar-Distilling Plant.

STOURBRIDGE GAS-WORKS.

By CHARLES H. WEBB, Assoc.M.Inst.C.E.,

Gas Engineer and Manager to the Stourbridge Urban District Council.

[A Paper read before the Institution of Municipal and County Engineers last Saturday.]

The works were established in 1835 by a Company of six shareholders; but it was not until twenty years later that they were incorporated by the Stourbridge Gas Act of 1855. The maximum price of gas mentioned in the Act is 6s. per 1000 cubic feet; and there is included a purchase clause in favour of the Local Authority. In all other respects, the Act is in the usual form. The undertaking was purchased by the Urban District Council of Stourbridge as and from Dec. 31, 1892, at a price of about £100,000.

The works are not situated in the area of the Council, but immediately over the boundary, in the parish of Amblecote, in Staffordshire. The present district supplied comprises Stourbridge, Amblecote, Lye, Wollescote, Pedmore, Hagley, Clent, Belbroughton, and part of Wordsley, with an area of 15,308 acres and a population of 39,915. The output of gas is high in proportion to the population; the area having, in addition to residential parts, large manufacturing districts with a working-class population. A large percentage of the gas is supplied for power and other trade uses, and there is also a heavy consumption by prepayment meters, gas fires, and cookers. The following comparison will show the progress made in the period that the works have been the property of the Council:—

	1892.		1911-12.
Annual make of gas, cub. ft.	96,000,000		231,182,000
Mileage of mains	37		60
Number of consumers	1340	ordinary	2243
		prepayment	5363
Public lamps	676		825
Tons of coal carbonized	8457		21,136
Capital	£47,500	(balance of loan)	£95,172
Gross profit	£4787		£11,366
Price of gas	2/8	2/8, 2/6, 2/-, 1/9, and 1/6 (according to quantity and use)	
Gas-cookers in use	nil		2634
Slot meters	nil		5363

The plant comprises a retort-house, containing eight beds of eight retorts (21 ft. by 22 in. by 16 in.) with Klönne regenerative furnaces and worked with West's manual machinery; a vertical water-cooled tubular condenser; two steam-driven exhausters; Livesey washer; rotary washer; five purifiers (30 ft. by 20 ft.); station meter; three gasholders, with a combined capacity of 1,100,000 cubic feet; pressure-raising plant and station governors (20 in., 16 in., 12 in., and a 12-inch safety governor). Humphreys and Glasgow's carburetted water-gas plant, of 500,000 cubic feet capacity, is now being erected, and two Lancashire boilers (24 ft. by 8 ft. diameter), to replace old egg-ended ones now in use, are being installed.

The works are served by a high-level railway siding connected with the Great Western Railway, for delivery of coal, sulphuric acid for the manufacture of sulphate of ammonia, for stores to cooker repairing and fitting shops, and the removal of sulphate of ammonia, oxide of iron, &c. There is also a low-level railway siding for loading coke; and the tar produced can be loaded into boats on the canal adjoining the works by gravity from the sales tank. In view of the demand for tar for road purposes, Wilson's tar dehydrating plant has recently been installed, and a description of this will perhaps be of interest.

The special feature of this particular plant is that it is on the enclosed system, the tar being dealt with in a slow continuous stream instead of in bulk. By this means the constancy of the finished product is more readily assured. This is an important point when working to the Road Board's specification, which can be done with this plant. The principle of the process is that the tar is heated (to about 160° C.) when under pressure (about 30 lbs. per square inch), and then released, when the water and light oils, being at a temperature higher than their respective boiling-points, are evaporated, and leave behind the dehydrated and acid-free tar. The plant used at Stourbridge is capable of dealing with 100 gallons of crude tar per hour. The tar is supplied from the land sale-tank by gravity into a suction or feed-tank, from which it is continuously pumped through a preheater or economizer, the coils of which are surrounded by hot dehydrated tar. After absorbing some of the heat in this, the crude tar passes to the still, which is a brick structure containing twelve laps of coiled piping, heated by a small breeze furnace with forced draught. The crude tar when passing through the coil is further heated, and

on leaving the still the pressure is suddenly reduced in the vapour-box, where there is a free space provided. The water and light oils being at a high temperature are vaporized, and leave the tar, which latter flows away through the preheater, where it parts with some of its heat, on to the store-tank for sale. From the top of the vapour-box the vapours pass through a coiled condenser surrounded by cold water, and thence to the receiver, where the ammoniacal liquor and light oils separate by gravity. The liquor is run back to the works well, while the light oils are barrelled and sold. The plant is simple, easily worked, and, from the reports received from other works where the process has been carried on for extended periods, gives very little trouble. It is necessary to obtain a certificate of registration under the Alkali Works Regulation Act of 1906; and the whole plant is regularly examined by the Government Inspector. As the greater proportion of the dehydrated tar will probably be required in the summer months, when the gas-works output is at a minimum, it is essential that there should be ample storage for crude tar; and also, to allow for rushes of work on the roads when the weather is fine, there should be good storage for the finished product.

As road engineers, you are doubtless most keenly interested in keeping the cost of the dehydrated tar as low as possible, and consequently your attention should be directed towards ensuring that the barrels used for packing should be treated by your men with the greatest care, and returned promptly. To pack a ton of dehydrated tar, five barrels are required; the cost at present prices being 5s. each. As the cost of these barrels has to be charged in the price of the tar, it will be seen that if the barrels can be made to last an increased number of journeys—say, eight instead of six—before being scrapped, the cost of packing per ton is reduced from 4s. 2d. to 3s. 1½d., or by upwards of 1s. a ton.

Discussion.

Mr. Sholto Douglas (Kenilworth) said he should particularly like to know the cost of the dehydrating plant, and also that of the treated tar as compared with the crude tar.

Mr. Dickinson (Redditch) congratulated the town on possessing the gas-works. The step they had taken in this matter was, he said, in the right direction and taken at the right time. His own authority had the opportunity of doing the same thing some years ago; but they did not avail themselves of it, and now had an electricity undertaking which cost them £1000 a year out of the rates.

Mr. Thorp (Malvern) said he was glad Mr. Webb had been able to put down the plant he had described, and expressed the hope that other authorities would follow his example, because the demand for tar was becoming greater every year. Mr. Webb had made rather a hit at surveyors on the subject of barrels. He (Mr. Thorp) did not think he could blame them, however, for their condition, because railways were not over-careful, and the barrels were subject to a good deal of rough usage by the men on the works. He was now supplying steel barrels, and thought it would pay in future to make use of these.

Mr. C. F. Gettings (Worcester) said he should like to call attention to the plant which Mr. Webb had laid down in connection with treating the tar. He thought he was to be commended for his enterprise. If his colleagues were to confer with the gas engineers in their respective towns, instead of the gas engineer trying to make the high profit which some of them had been endeavouring to do, they would all get a cheaper article, and be much better supplied than they were at the present time. He knew the plant which Mr. Webb had installed, and he had supplied them with a considerable quantity of tar, from which they were getting excellent results. He saw no reason why other towns should not do the same thing. It seemed ridiculous that many places having gas-works should send tar 50 and 60 miles away simply to be treated and come back again, when about half the cost was taken up with carriage. He thought both the companies and the corporations concerned would benefit by it.

GERMAN GAS AND WATER ASSOCIATION.

Water Supply Papers at the Annual Meeting.

It was mentioned in our special representative's review of the proceedings at the annual general meeting of the German Association of Gas and Water Engineers at Munich on the 24th to the 28th ult., that the papers on water supply, which were presented on the 26th, were of greater interest than usual, and evoked lively discussions. We give below summaries of the contents of the papers.

NEW METHODS OF STERILIZING LARGE QUANTITIES OF WATER AND THEIR TECHNICAL AND ECONOMICAL APPLICABILITY.

By Herr H. Peter, of Zürich.

The methods of purifying surface water for the purpose of water supply have of late undergone valuable improvement, and highly reliable results are now obtainable. The product, in fact, if proper means are employed, is not inferior to spring and well water. Calculations of the cost of installation and running of different methods are given for Zürich conditions; but it is pointed out that the figures are not generally applicable and should be recalculated for each locality. Slow sand filtration is suitable for the purification of river and lake water which is colourless, not of too high a degree of impurity, and does not contain more than 0·007 to 0·014 grain of plankton per gallon. With a larger amount, preliminary filtration or clarification, with perhaps the use of coagulants, is necessary. The Puech-Chabal stage filter may be used for the preliminary filtration, more especially in places where chemical precipitating agents must be avoided. Satisfactory results were attained at Magdeburg without preliminary clarification, and at three places on the Suez Canal with clarification (0·07 to 0·14 grain of potassium permanganate per gallon).

The American rapid filter in all cases requires a preliminary clarification of the water by the use of aluminium sulphate, thiosulphate, permanganate, or similar agents. They all work with great speed—viz., up to 400 feet in twenty-four hours—and are distinguished by requiring but little space and being mechanically actuated. They have answered well in many places—*e.g.*, St. Petersburg and Alexandria. The processes for sterilizing drinking water can only be applied along with mechanical purification. The chloride of lime process, as used frequently in America, depends on 0·07 to 0·21 grain of chloride of lime being mixed with each gallon of the water. Experience shows that the result depends on the amount added, but that with several hours' action it is satisfactory. The disadvantage of the process is that the taste of the water is marred.

The ozone process is trustworthy. About 56 grains of ozone are required per 1000 gallons of water, and for their production current of 0·075 unit is necessary. The works in St. Petersburg, on the Siemens de Fries system, has an output of about 11 million gallons per diem, and is quite satisfactory. Works for a capacity of nearly 20 million gallons per diem are being erected at St. Maur, near Paris.

The following table gives the calculated cost of different types of installations:

Method.	Cost of Installation per 20,000 Gallons Capacity per Diem.	Fixed Charges per 20,000 Gallons Capacity per Diem.
	£	d.
1.—Slow sand filtration of lake water at Zürich, without preliminary filter.	109	7·10
2.—Preliminary filter for lake water at Zürich . .	13	0·96
3.—Slow sand filtration, with preliminary filter at Zürich	122	5·00
4.—Puech-Chabal stage filter with rapid sand filtration (v = 33 feet)	91	6·00
5.—Ditto, ditto, with slow sand filtration (v = 10 feet)	200	9·45
6.—Coagulation with about 2 grains of aluminium sulphate per gallon, including clarifying beds for eight hours' action.	16	2·90
7.—Preliminary purification with 0·14 grain of potassium permanganate per gallon; two hours in clarifying beds	3½	2·25
8.—American Jewell rapid filter, clarification with 2 grains of aluminium sulphate per gallon .	68	8·84
9.—Missong filter as preliminary filter, single filtration (v. = 79 feet)	76	9·93
10.—Treatment with chloride of lime, without clarification or filtration	..	0·11–0·33
11.—Ozonization only of the water.	68	6·55
12.—Ozonization of the water, with preliminary clarification with aluminium sulphate, Jewell filter	182	16·15
13.—Ultra-violet radiation; complete apparatus with stage filter and rapid sand filter (v. = 33 feet)	136	11·78

The tabular statement shows that where slow sand filtration will give the desired effect, either alone or with simple auxiliaries, it is the most favourable method from the economical standpoint. For more foul water, the methods of sterilization with ozone or ultra-violet light are suitable, and will dispose of all sanitary objections to the use of surface water.

THE DISINFECTION OF DRINKING WATER BY CHLORIDE OF LIME.

By Dr. Bruns, a Professor at Gelsenkirchen.

The author reported on experiments which had been made for the disinfection of drinking water in the distributing system by the addition of small quantities of chloride of lime. The process has been in use for some years past on a large scale in America, where it is in constant use at many water-works. The method adopted is to make a large quantity of solution of chloride of lime and to put this solution into the collecting wells in such proportion that the active chlorine of the chloride of lime will be equal to about 0·035 to 0·07 grain per gallon of water. Assuming that the water contains only small quantities of oxydizable substances, such diluted solutions suffice to ensure disinfection of the water to such an extent that the greater part of the bacteria in it are destroyed. Laboratory experiments have demonstrated that it may be taken as certain that the greater part of the pathogenic organisms at least are destroyed. The author considers that in some circumstances such a process, which kills the greater part, though not every one, of the pathogenic bacteria, may be of service. The disadvantage of a distinctly disagreeable taste, which results from the addition of even such small quantities of chloride of lime to the

water, may be overcome in large measure by adding to the water also from 0·07 to 0·14 grain per gallon of sodium thiosulphate (in solution).

In consequence of the difficulties arising from the low water supplies of the past year, the process was for several months used at a number of water-works in the Ruhr district. In several cases no strong complaints were received as to the bad taste caused by the chloride of lime; but in other places very serious difficulties arose from the bad flavour of the water. The process, which is susceptible of some improvement, cannot be regarded as applicable generally, but merely as a help in cases of necessity. It would be possible, in times of epidemic, to institute by its means disinfection of the water in the mains without interrupting the supply. In particular, it might be usefully adopted wherever a high number of organisms occur temporarily in drinking water which is otherwise quite good, and where the use of other processes of sterilization, such as ozonization, which involve considerable capital expenditure, would not appear to be economically applicable. The cost of the process amounts to from 0·055d. to 0·11d. per 1000 gallons. It has therefore the advantages, in the cases indicated, of cheapness and ready applicability.

EFFECT OF THE DRY SUMMER OF 1911 ON TOWNS WATER SUPPLY

By Herr Reese, of Dortmund.

The author reported that he had, by desire of the Association, instituted an investigation into the drought of 1911 and its consequences. In order to collect the needful information, he had addressed a circular-letter of inquiry to the 421 water-works which are included in the volume of statistics published by the Association. Answers had been received from 327 of these works, of which 235 reported that they had not suffered from scarcity of water. But 37 of the latter works were admittedly working near the limit of their capacity, and had already adopted measures for the extension of their plant, with a view to avoiding a shortage of supply in future. Scarcity of water was reported by 92 works; and naturally it was experienced first and most severely by those dependent on springs as their source of supply. One of these works had a shortage as early as the middle of April, and it extended to the end of October. In May, two other works began to feel a shortage; and one of them was still suffering from it right up to the time at which its report was sent in. The shortage started in June with nine works; in July, with 37 other works; and in August, with nine works. The rest of the works either put their shortage later or do not give a definite date for its commencement. In many of the latter cases a failure proper was avoided by the issue of warnings, and the imposition of prohibitions and penalties for extravagant use of water.

In places where the shortage was felt most, in some cases recommendations to economy in the use of water were made, and in other cases the watering of streets and gardens was simply prohibited—the prohibition being in many districts enforceable by the police under local laws which impose a fine for disregard of it. In one instance, the use of water for private baths was forbidden under a liability to a fine of £7 10s. for each occasion on which it was used. One works raised the price of water, during the drought, by 50 per cent. for domestic, and by 5 per cent. for industrial, purposes. In specially severe cases, recourse was had to cutting-off the supply.

The means adopted to make the actual or anticipated shortage of water less severely felt have varied according to the situation of the works. Only one expedient was left to most works—viz., the extension of the existing installation as quickly as possible. Others fell back on less costly methods—such as the compulsory use of water-meters, the raising of the price of water, the establishment of connections (for use in cases of necessity) with neighbouring works, the provisional damming of streams from which the underground water is fed, the deepening of existing wells, &c. In the case of one bathing resort, the curative spring water was passed into the distributing system.

The author then proceeded to give a more detailed account of the conditions which had prevailed in water-works in the Ruhr valley, the water supply of which is controlled by an Association which was founded at Essen in 1898. The requirements of the water-works on the Ruhr have risen from 29,720 million gallons in that year to 69,365 million gallons in 1911. The receipts of the Association have quadrupled between 1898 and 1912. The Association has established in that period nine large valley dams on the Ruhr and its tributaries. The quantity of water impounded by these dams amounted to a total of about 7130 million gallons; and the cost of their provision has been about £624,000. The Association is further supporting the undertakers of the Lister valley dam, and is constructing the Möne valley dam, which will be finished in a few weeks' time. When these are finished, there will be eleven dams in the Ruhr district, giving a maximum of 41,074 million gallons of water impounded, and involving an expenditure of about £1,929,000. These works are intended to suffice until the year 1925 to replace the water which is removed by the pumping works in the Ruhr valley into the Ems valley, to the detriment of the flow in the Ruhr. A scheme is now being brought forward for Government approval for placing the Ruhr Valley Dam Association on a more permanent basis.

In conclusion, the author referred to the activities of another Association which had been formed to prevent the pollution of the Ruhr and its tributaries by works refuse and sewage.

The only other communication relating to water supply was one of less general interest—viz.,

THE WATER SUPPLY OF BAVARIAN TOWNS AND DISTRICTS.

By Herr Hocheder, of Munich.

The author, who is one of the Chief Government Officials at Munich, referred to the difficulty of obtaining adequate supplies of water in parts of Bavaria, notably in the Franconian Jura Mountain districts, and to the measures which the State was adopting to assist these localities in improving the supplies. Since the State Water Supply Bureau was founded in 1878, it had approved water projects involving in all an expenditure of about £3,180,000, and had made grants in aid of them. There was, however, still a great deal to be done. The author proceeded to describe the geological and hydrological conditions of the country, and the general character of the water supplies. Broadly, water which required purification in respect of organisms was scarcely used at all; purification was applied only with a view to removing iron, carbonic acid, and cloudiness due to clay, in order to avoid trouble in the mains and reservoirs.

In the discussion on this paper, Dr. Emmerich, Professor at the Munich Hygienic Institute, stated that drinking water supplies were never directly responsible for epidemics of typhus and cholera. Nevertheless, he agreed with Pettenkofer that towns and districts ought to be supplied with large quantities of pure water, as thereby the greatest inducement was given to cleanliness, which was the best means of combating such epidemics.

The Past Year's Work at Salford.

In their annual report submitted at last Wednesday's meeting of the Town Council, the Gas Committee of the Salford Corporation expressed their pleasure in recording that the usual growth in the number of consumers had been maintained. The sales of gas, however, showed a slight decrease. This was said to be due to the sale of the rights, powers, and privileges of the Corporation with respect to the supply of gas in the urban district of Little Hulton on March 31 last year, and to the effects of the national coal strike. The demand for gas appliances generally was satisfactory, and the business in cooking-stoves showed a considerable increase over the preceding year. The coal and cannel carbonized during the twelve months amounted to 163,101 tons, and the quantity of gas made was 1,676,389,000 cubic feet, of an average illuminating power of 19·20 standard candles, the parliamentary standard being 18 candles within the borough and 17 candles as tested in the out-districts. The total receipts from residuals showed a considerable increase. The report was adopted without discussion.

Biddulph Gas Purchase Question.—The Biddulph Urban District Council, at a special meeting, have decided by eight votes to seven to take steps to enter into negotiations with the Gas Company for the purchase of their undertaking at the lowest possible price.

The Thames during Last Year's Drought.—In the report of the Conservators of the Thames for the past year, which was issued last Tuesday, it is remarked that, in consequence of the drought, exceptional demands were made for the supply of water to the Metropolis from the river; and it was necessary for special precautionary measures to be taken with regard to the abstraction of water, in order that these demands could be met and the flow of the stream safeguarded. Such arrangements as were made proved satisfactory; but the Conservators state that it should not be lost sight of that had the condition of the Thames been similar to that of the summers of 1898, 1899, and 1906, it would have been impossible to draw on the river to a like extent without serious consequences. The Conservators therefore trust that the work of providing additional storage reservoirs by the Metropolitan Water Board will be pushed on with all despatch.

Management of the Newry Gas-Works.—The Newry Urban District Council, at their monthly meeting, carried by ten votes to seven a resolution to the effect that the Chairman of the Gas Committee (Mr. R. O'Robert) and the four other members of the Committee be asked for an explanation as to why they voted for the new Manager of the gas-works (Mr. Charles O'Reilly, of Strabane) when they had other applications before them with much higher qualifications; and that, failing a satisfactory explanation, they be called on to resign membership of the Gas Committee. Mr. O'Rorke, in the course of the discussion, said they had appointed the best Irishman they could get; and he would appoint an Irishman every time he could before an Englishman. Mr. Fisher remarked that, though other things being equal he would like to give an Irishman the preference, he did not think Mr. O'Reilly, who was described as a plumber and gas-fitter, was the proper man for the job. Subsequently, Dr. Kean handed in a notice to rescind the decision arrived at.

Plymouth Water-Works.—Members of the Plymouth Town Council paid their annual visit to the water-works last Wednesday, for the purpose of what is known as "the fishing feast," and once more drank to the pious memory of the originator of the water supply, Sir Francis Drake. In the course of the proceedings, Mr. R. W. Winnicott (the Chairman of the Water Committee) remarked that last year with its prolonged drought furnished a real test of the undertaking, and they had every reason to be satisfied that they were able to keep up a supply of water. Plymouth water was about the cheapest in England, and it was as pure as that of any other town. The average daily consumption last year was 6,375,000 gallons. The capacity of the reservoir was 657,000,000 gallons; and the daily intake in the driest period rarely fell below 3,000,000 gallons. The income last year rose to the unprecedented sum of £36,549; and after paying interest and sinking fund and other charges, they had a balance of £8361, which they were able to hand over in relief of the rates.

REGISTER OF PATENTS.

High-Pressure Gas-Lighting Systems.

W. M. Still and Sons, Limited, and E. H. Still, of Charles Street, Hatton Garden.

No. 13,814; June 9, 1911.

The object of this invention is said to be to obviate the danger of fire due to breakage of pipes containing high-pressure gas; and the invention is particularly applicable in connection with the gas lighting systems of railway carriages. The use of pipes containing high-pressure gas is entirely avoided by constructing the storage tank not only with a reducing outlet valve arrangement (as previously proposed), but also with a filling valve, which automatically closes and prevents the flow of gas from the tank into the filling pipe when the pressure in the latter—whether due to accidental breakage of the pipe or otherwise—falls below that in the tank. Means may also be provided for opening the filling valve against the internal pressure when it is desired to empty the tank.

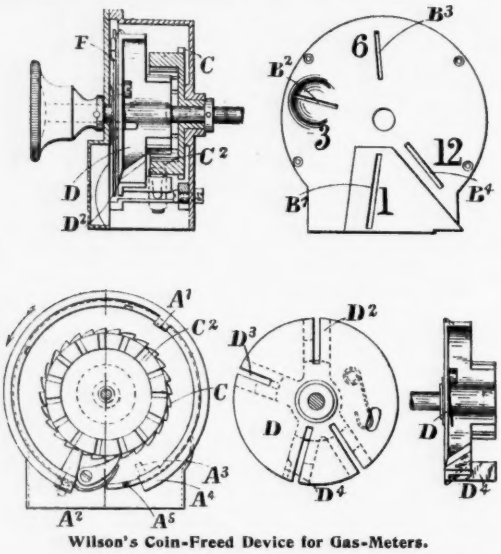
Coin-Freed Devices for Regulating the Supply of Gas.

Wilson, G., of 's-Gravenhage, Holland.

No. 10,852; May 4, 1911.

This invention relates to coin-freed devices, more particularly to the type in which the coin forms an operative connection between the coin-carrier (movable by the operator) and a wheel which controls the supply of gas. Thus the mechanisms, though commonly called "coin-freed," would more properly be denominated "coin-operated," as the coin does not release any mechanism but enables mechanism to be operated.

There is provided in the device adapted for use with coins of different values two or more stops which have the double function of (*a*) engaging the inserted coin and checking the carrier and wheel at the position for the quantity of gas allowed for the value of the coin employed, and (*b*) selecting the receptacle into which the coin is to be discharged. Various other details are described in the illustration given of one construction of mechanism according to the invention.



Wilson's Coin-Freed Device for Gas-Meters.

Fig. 1 is a vertical central section through the apparatus, in a plane at right angles to its face. Fig. 2 is the front elevation of the front plate through which the coins are inserted. Fig. 3 shows the control wheel in the main casing. Fig. 4 is a front view of the coin-carrier which is engaged with the control wheel by the coin. Fig. 5 is a side elevation of fig. 4.

The operation of the device is as follows: The coin-carrier D is turned in a clockwise direction, carrying with it the disc F till the latter is checked by the stop A^1. The motion of the coin-carrier is then continued till its stop D^1 engages the stop A^2, which is so situated relatively to the stop A^1 that the slots D^3 are then coincident with the slots F^2 in the safety-plate and with the slots B^2 in the front plate. Any coin may now be inserted in its corresponding slot B^1 B^2, &c.

As an example of the action of a silver coin, a sixpence may be inserted in the slot B^3. It passes into the slot D^3 in the coin-carrier and, projecting through it, engages one of the slots C^3 in the control or ratchet wheel, and locks it to the coin-carrier. This is then rotated in an anti-clockwise direction, and carries with it the control wheel C, which operates the ordinary mechanism permitting the fluid to flow. The coin-carrier is rotated until the sixpence, which projects radially beyond the rib D^2 (in whose slot it is lying), engages the stop A^2, and no further rotation of the control wheel is possible. At this point, however, the coin is opposite the forwardly extending part B^1 of the front plate, which provides an interior enlargement of the casing; so that the coin can move outward and forward through a slot in the casing and drop into the usual locked receptacle—having served to release an amount of gas proportional to its value. The action of the other silver coins is identical, save that the rotation imparted to the controlling wheel is varied—*e.g.*, the shilling is carried round twice as far as the sixpence before it is released.

The action with the copper coin is similar. It is inserted at B^1 in the same manner, but engages a stop A^5 on the main casing. Since this coin is larger than the silver coins, it may conveniently engage the edge of the casing at A^4 and be released by being brought opposite a gap A^5 in a small flange on the casing.

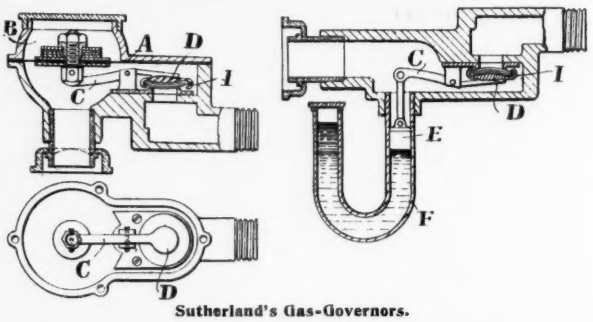
The various slots are so proportioned that if a smaller coin than the correct one be inserted in any slot, it is inoperative. Thus, if a threepenny piece or a sixpence is inserted into the shilling slot it is allowed to fall out, and a special shoot may be provided by which such rejected coins are discharged outside the cash receptacle. In the case of a smaller coin being inserted in the slot for the sixpences, since that slot is situated vertically, the coin drops straight through and out into the shoot provided.

Gas-Governors.

Sutherland, J. G. & A. G., of Birmingham.

No. 19,156; Aug. 26, 1911.

This invention relates to valves with metallic discs having undercut recesses which retain in position the material forming the engaging face of the valve; and the valve-face is always maintained in a supple and resilient condition by incorporating under, or within, the engaging face suitable absorbent material containing lubricant.



Sutherland's Gas-Governors.

In the preferred form of valve, as shown on the drawings, the valve D (of circular formation) is first of all provided on its active face with pieces of coarse textile material soaked with lubricant. Upon this is placed a disc of cloth, felt, or like material, also impregnated with lubricant. And, finally, an outer layer or disc of leather is placed in position which forms the engaging face of the valve. Undercut recesses I are provided at the circumference of the active face of the valve; and the layers of material are of such diameter as to be securely held in position by them.

In the first arrangement shown, the valve for controlling the gas-inlet is operated by a flexible diaphragm A in a suitable housing B through the medium of a fulcrummed lever C of the first order; one extremity of the lever being attached to the back of the valve and the other to the diaphragm which is exposed to the pressure on the outlet side. The pivotal point of the lever is advantageously arranged nearer the valve than the diaphragm, in order to give the latter a mechanical advantage in actuating the valve.

In the other type of governor shown, the valve controlling the gas-inlet is operated by a float acting on the surface of a fluid of relatively larger specific gravity, such as water, glycerine, mercury, and the like, contained in a tube F, preferably U shaped, one arm of which is open to the atmosphere while the other buoys up the float E.

In both types of governors, if the pressure on the outlet side—that is, the lower pressure—falls below the point at which it is required to be maintained, the diaphragm or the float actuates the one end of the fulcrummed lever C of the first order, with the result that the opposite extremity controlling the valve displaces the latter from its seat, and gas at a higher pressure passes from the inlet to the outlet until the standard is again reached, when the valve closes until the pressure is reduced on the outlet side.

Manufacture of Incandescent Mantles.

Bruno, W., of Berlin.

No. 27,834; Dec. 11, 1911. Date claimed under International Convention, Jan. 5, 1911.

This process for the manufacture of incandescent mantles has for its object to obtain the illuminating salts in the form of oxalates on the fibrous material previous to incinerating the mantles, as it is said to have been found that "by this means mantles can be obtained of excellent quality, both as regards elasticity and firmness against tension and shock."

In patent No. 12,465 of 1909 a process was described in which the fibrous material, after saturating with nitrates of illuminating salts, is immersed in a solution consisting of oxalic acid and ammonia—thus producing basic double compounds, which, when the mantle is incinerated, yield the oxides of the metals. It has also been proposed to coat a platinum, gold, or other electro-conductive and indestructible foundation with an oxide of metallic earth by electrolytically depositing the hydroxide of the metal thereon and then immersing the body in an aqueous solution of oxalic acid or ammonium oxalate.

In carrying out the present invention, fibrous material is used (as is now usual) as the foundation; and after it has been saturated with nitrates of illuminating salts and these have been converted into hydroxides, peroxides, or their hydrates by treating with alkalies or with hydrogen peroxide or the like in the usual manner, the hydroxides, peroxides, or their hydrates are converted into oxalates by subsequent treatment with a solution of oxalic acid. If desired, however, the fibrous material may, as usual, be firstly treated with ammonium

oxalate so as to give thorium-ammonium-oxalate, and be thereafter treated with oxalic acid to yield the ordinary oxalates.

Mantles prepared in this manner "yield, at incandescent heat, an ash structure which possesses exceptionally good characteristics and is of excellent tenacity."

In order that the invention may be more clearly understood, the patentee gives the following by way of example: The fibrous material constituting the mantles is firstly saturated, in known manner, with soluble illuminating salts or nitrates, and is thereupon treated in known manner with alkaline solutions—such as ammonia—so as to convert the salts into the corresponding hydroxides. If desired, however, the ammoniacal precipitation may be replaced by the well-known hydrogen peroxide precipitation, so as to convert the salts into the corresponding peroxides or their hydrates. Ammonium oxalate may also be added, if desired, to the precipitant in order to form double oxalates at this stage. The mantles are then washed to remove the soluble salts, and are thereupon immersed in a moderately concentrated (say, a 10 per cent.) solution of oxalic acid. The mantles are then dried and preferably washed. "The unburnt mantles contain the illuminating salts as pure oxalates, and, on incineration, yield a pseudo-morphous structure, consisting of oxides, of extraordinary elasticity and firmness."

Vertical Retorts.

DUCKHAM, A. M'D., of Little Bookham, Surrey.

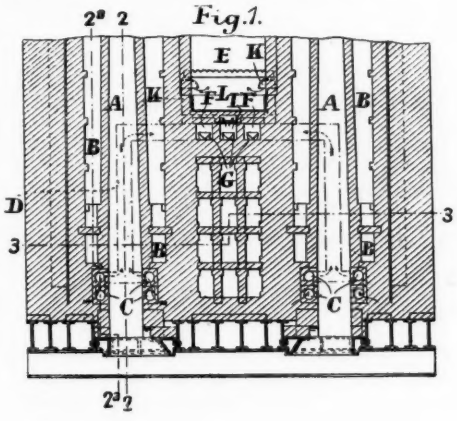
No. 28,852; Dec. 21, 1911.

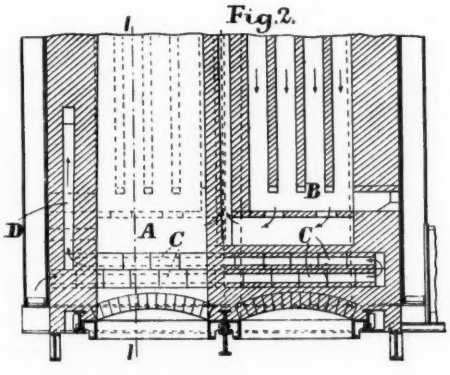
In his specification the patentee says: "In vertical retorts for the carbonization of coal, where the coke is more or less continually being discharged from the retort, there is a considerable waste of heat, due to the temperature at which the coke leaves the retort. It has been suggested to diminish this loss by passing the secondary air which is to be afterwards admitted to the combustion chambers, or both this air and the primary air for the gas-producer, through passages around the bottom of the retort. This may be satisfactory and economical where no regenerator or recuperator is used, but there is a loss of efficiency if the secondary air enters the regenerator or recuperator at a high temperature."

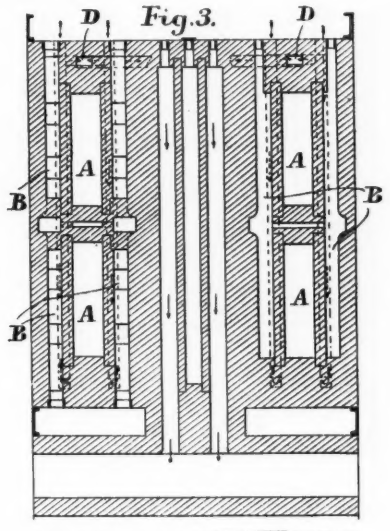
Where vertical retorts are provided with a regenerator for heating the secondary air, it is proposed to remove heat from the coke by passing around the lower part of the retort the primary air alone—that is to say, the air which is to gasify the fuel in the producer. The primary air thus heated is then saturated with water vapour by coming in contact with water on its way to the producer. The use of hot dry primary air in the producer, the patentee points out, is not permissible, as it would injuriously affect the fire-bars and also form clinker which would be difficult to remove; but by the use of the warm air containing moisture he ensures that the primary gases are of higher calorific value, that the life of the firebars is prolonged, and that the clinkering is much more easily accomplished.

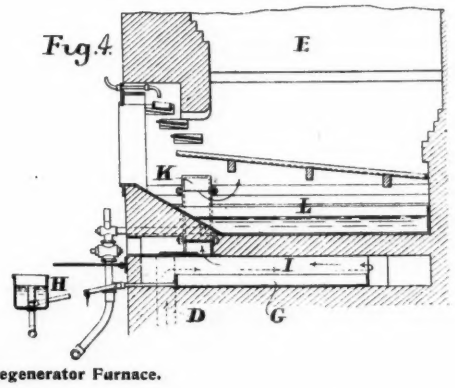
Fig. 1 is a vertical section on the line 1—1 of the lower part of a setting comprising four vertical retorts. Fig. 2 is a like section on the line 2—2 as to its left-hand half, and on the line 2—2a as to its right-hand half. Fig. 3 is a sectional plan on the line 3—3. Fig. 4 is a section through the producer, drawn to an enlarged scale.

The retorts A are of rectangular cross section; and in the brickwork constituting the sides of the retorts below the heating flues B are passages C. In the example shown there are two passages—one above the other, on each side of a pair of retorts. The lower passage is open to the atmosphere at one end and communicates at the other end with one end of the upper passage. The other end of the upper passage is









Duckham's Vertical Retort Regenerator Furnace.

connected with a flue D common to both upper passages and rising in the brickwork at the end of the retort to the level of the producer E. Here the flue turns at right angles (fig. 1) and terminates in a horizontal flue F, beneath the producer, and containing a trough G kept charged with water by a constant-level device H (fig. 4). There are two flues F, having a third I between them. The two flues D corresponding with the two pairs of retorts communicate with the flues F at one end; the other end of each flue communicating with one end of the flue I, the other end of which communicates with flues K adapted to deliver moist air beneath the fire-bars of the producer after directing it downwards on to the surface of water in a trough L.

Automatically Lighting and Extinguishing Gas-Lamps.

FROST, A. C., of Four Oaks, Warwickshire, and WRIGHT, A. C., of Birmingham.

No. 1975; Jan. 24, 1912.

This apparatus, for automatically lighting and extinguishing gas-lamps, is of the kind in which a clockwork driven arbor or timing disc, revolving once in twenty-four hours, has mounted on it a circumferentially expansible tappet or cam device, comprising a fixed sector vane and one or more sector vanes which are circumferentially adjustable with respect to the fixed vane, and may be turned so as to overlap the latter vane—the cam device being adapted to control the alternate opening and closing of a valve which controls the supply of gas to the burner.

The improved construction particularly relates to the form of the front edge of the vanes or cam which has to be inclined rearwardly so as to shift the valve more or less gradually from the open to the closed position. When this rearward inclination is but slight, and the valve is one which is acted upon by the vanes so as to slide longitudinally in its casing, there is a tendency for the valve to bind; and if the rearward inclination is excessive, too long a time is taken to shift the valve from the open to the closed position.

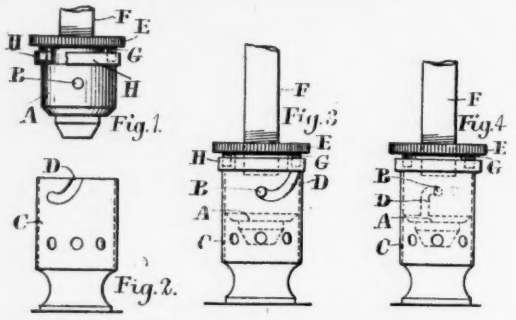
Both these objections are avoided, according to the present invention, by making the front edges of the vanes slope backwards comparatively slightly, and by so arranging the valve casing with respect to the timing disc that the valve is guided in its casing to slide in a line which is intermediate between the radius of the timing disc passing through the valve and the tangent from the valve to the rear edge of the timing disc or vanes.

Inverted Gas-Burners.

CARPENTER, C. C., of Old Kent Road, S.E.

No. 25,874; Nov. 20, 1911.

This invention consists of a modification of the means for removably attaching bunsen burners to their fittings in inverted incandescent gas-lamps, as described in patent No. 5289 of 1909. In that arrangement there was a cap forming part of the gas-fitting surrounding the nozzle, and a bayonet joint between the cap and the end of the bunsen tube was introduced into the space between the cap and the nozzle to be partly rotated to secure it in position—a spring being provided in such a position within the cap bearing on the end of the bunsen tube that its compression was necessary before the locking or unlocking of the joint could be effected. According to the present modification, the cap is dispensed with and the attachment of the bunsen tube is made to the nozzle direct; a spring being provided to press against a loose ring overlying the end of the bunsen tube, to act in the same manner as before for retaining the connection.



Carpenter's Inverted Gas-Burners.

Fig. 1 shows the nozzle and fig. 2 the end of a bunsen tube separate from one another. Fig. 3 shows the two fitted together. The nozzle in fig. 4 shows a slight difference.

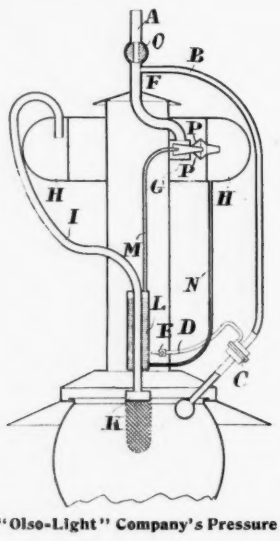
A is the nozzle, having laterally projecting pins B; and C is the bunsen tube having at its upper end bayonet slots D, to engage with the pins. If preferred the pins may be on the inside of the tube C, and there may be external bayonet grooves on the interior nozzle as shown in fig. 4. E is a back nut for locking the nozzle on the supply pipe F; and G is a spring between the back nut and a loose collar H for retaining the engagement of the bayonet connection.

Gas Lighting and Heating Apparatus.

OLSO-LICHT-GESELLSCHAFT, HALBMAYR, and Co., of Vienna.

No. 23,321; Oct. 23, 1911. Date claimed under International Convention, Nov. 18, 1910.

It has already been proposed (the patentees point out) to arrange, in proximity to burners, apparatus in which a liquid gives off vapour by which the gas or the necessary air for its combustion is placed under pressure for the purpose of promoting the combustion. This arrangement requires the provision of an auxiliary heating flame which may be extinguished when the main burner flame is heating the vaporizer. The present invention has for its object to provide improved apparatus for shutting off automatically the gas supply to the auxiliary heating flame of lamps, furnaces, and the like, as soon as the main flame of the lamp or furnace has come into operation.



The "Olso-Light" Company's Pressure Burner.

One construction of such apparatus is illustrated in "diagrammatic vertical section"—an inverted incandescent gas-lamp worked with compressed air fitted with the apparatus.

From the main gas supply pipe A there is branched off a pipe B leading to a thermo-valve C connected by a pipe D to a bunsen burner E. The gas supply pipe F of the incandescent burner leads to a nozzle G, whence the gas passes into a chamber H, which receives the mixture of gas and air that is led through a mixing-pipe I to the lamp-burner K. Around the pipe I is an annular vessel L, from which a pipe M leads to the nozzle G.

The operation of the apparatus is as follows: On opening the cock O the gas passes through the pipe B, valve C, and pipe D to the bunsen burner E. When the mixture of gas and air is ignited, the heating flame will heat the vessel L, "which is filled with a vaporizable substance, preferably mercury." The mercury becomes converted into vapour, which passes through the pipe M to the nozzle G, in issuing from which it draws in air through the holes P in the nozzle and gas from the pipe F. This mixture of gas and air is forced under pressure into the chamber H, whence it passes through pipe I to the burner.

The mercury vapours issuing from the nozzle G are condensed, and the condensed mercury runs down the pipe N back into the vessel L. The heat generated by the burning of the main burner flame acts upon the thermo-valve C in such a manner that the latter closes the gas supply pipe B so long as the lamp flame is burning; but when the pipe is closed, the auxiliary flame is extinguished. When the main burner flame is extinguished, the thermo-valve returns to its original position; and the gas supply is again opened to the auxiliary flame.

The thermo-valve may be operated by a rod extending within the range of the main burner flame and acting upon a diaphragm in such a manner that when the rod is heated its expansion will press the diaphragm against the gas supply pipe B so as to close it.

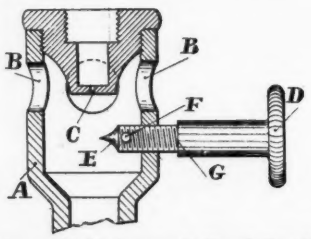
Regulating the Supply of Air to Bunsen Burners.

MANNESMANNLICHT G.M.B.H., of Remscheid, Germany.

No. 618; Jan. 8, 1912. Date claimed under International Convention, Jan. 9, 1911.

The patentees point out that devices have already been employed for regulating the supply of air to bunsen burners, of which the following may be taken as examples: (1) The air admission openings, generally arranged close to the burner, have been varied in size by means of a rotating sleeve or disc. (2) The outlet for the mixture of gas and air has been made narrower or wider as necessary. (3) At a suitable place in the mixing-tube, interchangeable annular discs (having varied bores or sieves of various mesh) have been arranged. (4) Adjusting screws have been passed through the walls of the mixing-tube, and by adjusting these by means of a milled head or the like from the outside the cross section of the mixing-tube can be varied as required.

Of these various methods, No. 4 has the disadvantage that, owing to the increased pressure in the mixing-tube, gas can escape along the screw threads—causing the burner to smell—the more readily since the screw cannot be made to fit too tight, or it may easily get fixed. The action of the screw depends, as also do the devices in methods Nos. 2 and 3, on varying the quantity of air by the change in the cross section of the mixing-tube—the force of suction, tending to draw the air in (dependent on the gas pressure of the stream of gas), however, remains the same in all cases.



Mannesmann Light Company's Regulating Burner.

According to the present invention, the control of the quantity of air is effected by varying the force of suction due to the stream of gas issuing from the nozzle, while the width of the inlet openings for the air and the cross section of the mixing-tube remain unaltered. The simplest means of effecting this variation in the force of suction is as illustrated in the engraving. Here A is the mixing-tube of a burner intended for an inverted incandescent gas-lamp, and has air inlet openings B. C is the nozzle through which the gas passes; and D is the air regulating screw, which acts on the stream of gas by means of its pointed end E. If the screw is flat at the end, then a smaller turn of the screw will give a larger variation in the quantity of air drawn in; if, on the other hand, it is finely tapered, then more rotations will be necessary before a greater variation in the quantity of air takes place. A pin F may be passed through the end of the screw, so as to prevent it being screwed out too far.

If the screw is screwed in too far, there is the danger that a part of the gas, striking against the screw, might pass out through the air inlet openings. But to prevent this, a collar G is arranged on the screw, which will prevent it being screwed in too far. For the same reason, the air inlet openings and the adjusting screw are kept as far apart from each other as possible.

Safety-Valves for Preventing Gas Leakage.

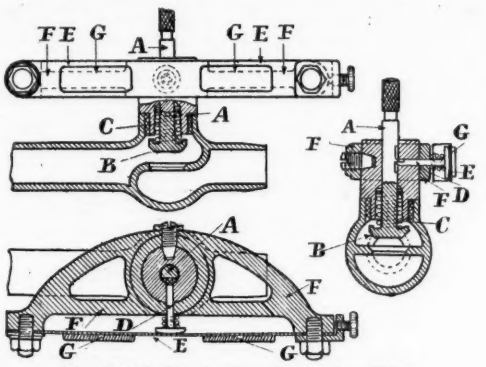
MARCHETTO, L., of Turin, Italy.

No. 1622; Jan. 20, 1912.

These automatically operated safety valves (for shutting off the supply of gas in case of leakage) are of the type in which the heat developed owing to the absorption of the escaped gas by spongy platinum is utilized to operate mechanism for closing the valve. The valve is held off its seat against the pressure of a spring by means of pawl mechanism, the pawl of which is held in the active position by a strip of metal against which it bears – the strip being stretched between two fixed points and provided with mountings of spongy platinum, which,

when gas is present in the surrounding air, become heated so that the strip extends and becomes curved and shifts the pawl so as to effect the closing of the valve.

The valve-chest is closed on the top by a cover, through which passes (with sliding fit) a rod A carrying a valve B. A spiral spring C, embracing the valve-rod and abutting at one end against the valve, and at the other against a free washer, tends to hold the valve against its seat. Between the washer and the bottom of the boring in the cover suitable packing forms a sort of stuffing-box for the rod.



Marchetto's Gas Leakage Preventing Valve.

The valve is normally kept raised by a pawl D, mounted (capable of sliding transversely) in the cover and of which the inner end engages in a notch in the rod. The pawl is held in the active position shown by means of a strip of metal E, against which it bears, under the action of a spiral spring, the outer end of the pawl being in contact with the strip. The strip (preferably of zinc) is attached to the ends of a double arm F, preferably also of zinc, attached to the cover. The strip is provided with mountings G of spongy platinum. The safety valve is placed in the region to be protected, and is inserted in the gas supply pipe traversing the region—preferably at the most elevated point of the pipe.

When illuminating gas escapes in the vicinity of the valve, the mountings G, of spongy platinum, become heated, and cause extension of the strip E which, as it cannot become elongated (since it is fixed at the ends) curves slightly outwards. The pivoted pawl D, which is held up against the strip by the spring, also moves out so that its inner end moves, enabling the valve B, under the action of the spring C, to come down on its seat and shut off the gas supply. When the mountings and the strip have come back to their normal temperature, the valve can be again lifted and the device restored to active position.

Production of Sulphite and Sulphate of Ammonia.

BURKHEISER, K., of Hamburg.

No. 6471; March 15, 1912. Date claimed under International Convention, Sept. 26, 1911.

In the process for purifying gases produced by dry distillation or gasification, with simultaneous recovery of bye-products in accordance with patent No. 21,763 of 1908, the gases containing NH_3 and the air containing SO_2 are alternately brought into contact with a washing liquid without the carriers of these (gas and nitrogen) coming into contact with one another.

In working, the process was so manipulated that the wash-liquid coming from the ammonia scrubber was collected in a low-lying tank. The lye collecting in the tank consisted, when working the plant and using water as wash-liquid, of ammonia water (NH_4OH). This ammonia water was delivered by a pump to an elevated tank, and from there to the SO_2 washer for sprinkling it. The lye running off from the SO_2 washer, and which lye then consisted, through the reception of SO_2, of primary sulphite of ammonia, was likewise led into a separate low-lying tank and then again conveyed by a pump into the separate elevated tank serving for the sprinkling of the ammonia scrubber. The lye collected in this elevated tank, and consisting of primary sulphite of ammonia now took up again NH_3 by the sprinkling of the ammonia scrubber, and there was formed normal sulphite of ammonia. If this cycle is carried further, it is found that alternate formation of primary and normal sulphite takes place. For the maintenance of the working of this so-called alternate washing there were required, for the separation of the wash-liquid, several separate elevated and low-lying tanks, together with the necessary pumps to transfer the lye to and fro.

The subject-matter of the present invention is a process for simplifying the foregoing process in such manner that a mixture of primary and normal sulphite of ammonia is used as washing liquid, and which mixture is conducted from a common elevated tank to the NH_3 and SO_2 scrubbers, and from these appliances is collected in a common low-lying tank. This washing liquid is always ready to receive SO_2 as well as NH_3, and by the passage through the SO_2 scrubber the normal sulphite is converted into primary sulphite, while the primary sulphite of ammonia contained in the washing liquid passes unchanged through the SO_2 washer. In the NH_3 scrubber, on the contrary, the normal sulphite of ammonia remains unaltered, while the primary sulphite of ammonia is changed into normal sulphite of ammonia. The lye coming from the NH_3 and SO_2 scrubbers and collecting again in the low-lying tank thus consists of a mixture of primary and normal sulphite of ammonia, and is again in a condition to receive both SO_2 and NH_3 and to serve for sprinkling the before-mentioned apparatus. Instead of several elevated and low-lying tanks and the corresponding number of pumps for conveying the washing liquid, there are in this process only one elevated and one low-lying tank and one pump. The process is thus "materially simplified," both as to working and manipulation.

In this process, the washing liquid is enriched always more and more with normal sulphite of ammonia until the limit of saturation is reached, and the normal sulphite of ammonia is deposited as a fixed salt. Care must, however, now be taken that the salt is removed when the most complete possible absorption of ammonia has been reached.

The invention relates further to the separation of the ammonia in two stages—firstly, in a saturator, where, by absorption of the greater part of the ammonia, the formation of salt takes place, then in a scrubber, where the remainder of the ammonia is washed out. Both appliances—saturator and ammonia scrubber—are supplied with washing liquid, consisting of primary and normal sulphite of ammonia, from the same elevated tank. The gas which first passes with its whole quantity of ammonia to the saturator, gives up there the greater part of its ammonia; so that the deposit of salt must necessarily take place in that apparatus. There then passes to the ammonia scrubber only the smaller part of the ammonia content of the gas; so that in this apparatus only a small enrichment of the washing liquid with normal sulphite of ammonia takes place, and a deposit of salt can never occur in this washer. By these means the washing out of the ammonia is complete under all circumstances, because only a part of the capability of the washing liquid conveyed to the ammonia scrubber is brought into play. Further, by causing the separation of the salt to take place in the saturator, all stoppage by the formation of salt in the ammonia washer is avoided.

APPLICATIONS FOR LETTERS PATENT.

14,702.—STETTINER CHAMOTTE-FABRIK AKT.-GES. VORM. DIDIER, "Regenerative gas-generating furnace." June 24.

14,820.—STILL, W. M. and SONS, LTD., ADAMSON, A. J., and KITSON, A. J. D., "Vapour-burning lamps." June 25.

14,885.—YARROW, M., "Joints of pipes." June 26.

14,891.—WINSCOM, G. H., "Gas cooking utensil." June 26.

14,893-4.—DOWSON AND MASON GAS PLANT COMPANY, LTD., and STOKES, J. W. B., "Gas-producers." June 26.

14,940.—SCHOMBURG, L., "Joints for pipes." June 26.

15,096.—ANDERSON, W., MEIKLE, J., and FULTON, C. W., "Retorts." June 28.

15,209.—BOUHON, L. J. R., "Purification of gases." June 29.

15,211.—BERRY, J., GLOVER, W. T., and METERS LIMITED, "Registering mechanism of gas-meters." June 29.

15,241.—HODGSON, J. L., "Fluid meters." June 29.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents*]

Alliance and Dublin Gas Company.

SIR, —Absence on a short holiday has prevented me from continuing my criticisms of this Company; and, in order only to maintain the interest in the matter, I propose writing but briefly this week.

I have no intention whatever either of writing the Company for an explanation or ceasing this correspondence, unless you call "time." I am a holder of ordinary stock, and have, with many of my friends, suffered considerable loss by the continued depreciation. This alone justifies my attitude. But, in addition, I know from voluntary evidence that many British stockholders heartily support me, and endorse my complaint.

Therefore, with your permission, I shall continue from time to time to expose what I consider is necessary—not with a view of injuring anybody's interests, but of ultimately securing a drastic and lasting remedy for the unbearable and very shocking state of affairs.

If Mr. Farquharson will kindly read my letters from the commencement, he will find abundant evidence, I am sure, to alter his opinion, and discount entirely the political influence. There is no support to such an idea; otherwise other undertakings in Ireland would be equally adversely affected.

When one sees companies owning gas-works in foreign countries whose monopolies are secured by terminable concessions (instead of a permanent Charter as with Dublin), and their stocks standing at prices to yield well under 5 per cent., it needs no further evidence to rebut the suggestion as to political influence, and to make one turn-about sharply and seek for the true cause of the trouble.

NONULUS.

June 5, 1912.

State Control of Gas Supply in the United States.

SIR,—In your issue of June 4 you comment editorially on the second part of my Philadelphia lecture in a way which suggests a misapprehension of what I was attempting to do. I therefore venture to ask permission to offer a few words in explanation.

In the first place, let me say that there is no disagreement between the Director of the Washington Bureau of Standards and myself concerning the questions discussed in the "Circular No. 32," to which you refer. The circular was prepared under my immediate direction, and contains not the rules which the Bureau of Standards has made on its own authority (because the Bureau has no legislative authority), but attempts to formulate rules which are supported by "the consensus of opinion of those best qualified to express opinions," and to justify the rules by a full discussion of the various questions involved. The proposed rules are commended to the consideration of State Legislatures and Commissions, City Councils, &c., whose duty it is to make regulations, and also to the gas industry. The Bureau is very conservative in all such cases, and would not propose a radical change in so important a matter as the specification of the standard for the calorific value of gas until such change had been fully discussed by the representatives of the gas interests, as well as the representatives of the public—including in the latter the State Commissions and City Gas Inspectors. The views that I expressed are also held substantially by those of my colleagues in the Bureau of Standards who have given

the question most consideration. Future editions of "Circular No. 32" will probably say more concerning the net calorific value.

You say my proposals suggest "academic complication." I pointed out that the method now in use is subject to considerable uncertainty—due to variation in atmospheric humidity and temperature—whereas the net value is free from such uncertainty. Also, correcting to 30 inches barometric pressure when the prevailing barometric pressure is 27 inches gives a constant error of 10 per cent. My proposal does not in the least complicate the calculation. It is just as easy to reduce to 27 inches as to 30 inches; and it gives a true value, if the actual pressure is 27 inches. Reducing to 30 inches gives a fictitious and misleading value, which in my opinion is neither scientific nor honest. To say of a gas that is delivered at 25 inches barometric pressure that it is 600 B.T.U. gas, when in reality it is only 500 B.T.U. as the customers get it, is not a procedure that will be permanently tolerated; and I think that the gas companies will not defend it when they come to realize fully what is implied in the present custom.

Heavy penalties are sometimes provided if gas falls below the standard fixed by law, and the method of specifying the standard (whether the calorific value or the photometric value) should be so definite that different observers will find the same value (within the unavoidable errors of experiment), irrespective of the state of the atmosphere at the time. You suggest that a difference of a few units one way or the other cannot amount to much to anyone. Would you encourage the use of faulty calorimeters and photometers, and faulty standards, on the same ground? In America, gas is not so cheap as to justify the use of instruments and standards that are needlessly unreliable.

If you will examine my proposal again, I think you will find that the apparent complications disappear. At any rate, I sincerely hope that on further consideration you will have a different feeling than that evinced by the last sentence of the editorial.

My suggestion of referring the question for study to a Committee of the American Gas Institute and the Bureau of Standards, was due to a desire to be conservative and fair, but without being so conservative as to feel that whatever is is right, and ought to continue.

E. B. Rosa,
Department of Commerce and Labour
(Bureau of Standards).

Washington, D.C., June 15, 1912.

Incidence of the Day-Load Factor.

Sir,—After reading Mr. Townsend's Institution paper on the above subject and the discussion upon it, one is led to ask: Is it possible to prove that the day load will increase proportionately to a reduction in price? As was stated by Mr. Glover, "a high day load may mean a low lighting load. We do not wish to sell gas in any particular way; we want to sell gas." The view that the price of day gas should be about one-half the cost of lighting gas is hardly borne out by the returns available.

Two methods may be adopted for selling gas—either through one meter on a flat-rate, with or without discounts for prompt payment; or through two meters, one for lighting gas and the other for heating, &c., gas, with, of course, differential prices for each. It then follows that if the price for day gas is sufficiently attractive to command all the cooking and heating in an average dwelling-house, the gas so used will be considerably greater in quantity than that used for lighting—probably in the proportion of 2:1. If the cost of heating gas is fixed at 2s. and that of lighting gas at 3s. 6d. per 1000 cubic feet, there will be sold 2000 cubic feet at 2s. and 1000 cubic feet at 3s. 6d.—making a total of 3000 cubic feet, at an average price of 2s. 6d. It is therefore a question for each engineer to solve, as regards gas for domestic use in his own district, whether he will sell all his gas at a flat-rate—say, 2s. 6d. per 1000 cubic feet—through one meter, or incur the additional capital, maintenance, supervision, and clerical charges involved in having two meters and two rates of charge. If looked at in this light, the weight of evidence seems to be on the side of the flat-rate.

But, after all, "we want to sell gas;" and the true measure of our success must be comparable in the way shown in the table giving the "consumption per head of population." By a coincidence, the writer has been for some time engaged in abstracting this figure for all the undertakings mentioned in the "Gas-Works Directory," and the results afford much food for thought.

As stated in Mr. Townsend's paper, local conditions affect the result; but, broadly speaking, the highest consumption per head is found in holiday resorts and manufacturing towns, and the lowest in some of the country towns and villages, while colliery districts, where solid fuel is cheap, come in between. It is plainly demonstrable, however, that the highest consumption per head follows the lowest price per 1000 cubic feet. It is impossible to give a long list in a letter. But the appended table illustrates the foregoing points; and the writer submits that a low flat-rate will, in the end, prove more remunerative to an undertaking than any complicated system of differential prices or rebates, with a duplication of meters and clerical work, not to speak of capital charges, maintenance, and supervision.

	Consumption per Head.	Price. s. d.		Consumption per Head.	Price. s. d.
Ilkley	12,700	2 10	Birmingham	8,006	1 9
Newcastle	9,956	1 11½	Bethesda	381	5 10
Widnes	9,270	1 1	Bellingham	511	6 6
Blackpool	9,100	2 2	Wigan	3,070	2 10
Eastbourne	8,010	2 6	Nuneaton	2,243	3 6

H. King Hiller.

9, *Victoria Street, S.W., July 1, 1912.*

The Jubilee Gas Exhibition Next Year.—The Gas Committee of the Salford Corporation have guaranteed a sum not exceeding £176, calculated upon the basis of five guineas per 50,000 cubic feet of gas manufactured, towards the estimated cost of the Jubilee Gas Exhibition to be held in London in October next year. This has been confirmed by the Council. The Rochdale Town Council have passed a minute of the Gas Committee guaranteeing 65 guineas towards the expenses connected with the exhibition.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bills read a second time and committed: Keighley Corporation Bill, Local Government Provisional Orders (Gas) Bill.

Bills reported: Ashborne Urban District Council (Gas) Bill, Bognor Gaslight and Coke Company (Electricity) Bill, Fleetwood Gas Bill, Ivybridge Urban District Water Bill.

Bills read the third time and passed: Bedwellty Urban District Council Bill, Belfast Water Bill, Scunthorpe Urban District Water Bill, Tavistock Urban District Council Bill.

The opposition to the Fylde Water Board Bill and the Gas Companies (Standard Burner) Bill has been withdrawn.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Lords Bills reported: Christchurch Gas Bill, Herne Bay Gas Bill, Houghton-le-Spring District Gas Bill, Wakefield Gas Bill, York United Gas Bill.

Lords Bills read the third time and passed: Brodsworth and District Gas Bill, Derwent Valley Water Bill, Lea Bridge District Gas Bill, Maidenhead Gas Bill, North Middlesex Gas Bill, Southgate and District Gas Bill, Tendring Hundred Water and Gas Bill, Wandsworth, Wimbledon, and Epsom District Gas Bill.

The Bromley Corporation have withdrawn their petition against the South Suburban Gas Bill [Lords], and the Woking Urban District Council theirs against the Woking District Gas Bill [Lords].

Mr. Herbert Lewis has introduced a Bill to enable the Local Government Board, by Provisional Order, to give powers to local authorities for the purpose of the acquisition of water; and it has been read the first time.

Electric Lighting of the House.

Last Tuesday, Mr. Lynch asked the honourable Member for St. George's-in-the-East (Mr. Benn), as representing the First Commissioner of Works, whether experiments had been carried through with regard to different filaments for the electric lights of the House; and, if so, whether he could state the conclusions obtained. Mr. Benn said experiments had not been carried out; the tungsten filament being considered the best.

The Proposed Committee on Illumination.

Last Tuesday, Mr. Lynch asked the Home Secretary whether he purposed limiting the proposed Committee on Illumination to the *personnel* of the Department, in view of the eventuality of an International Congress on Illumination being held, and having regard also to the scope of inquiry of the French Commission; and whether experts competent to deal with every aspect of the question, and two or three Members of Parliament to consider the problems in their legislative bearings, would be appointed on the Committee. Mr. M'Kenna replied that it was not the intention to limit the Committee to officials of the Department. As had been stated in reply to a previous question, the Committee would be one of experts, and they would be chosen as far as possible to represent the varied questions involved. In view of the fact that the inquiry would be of a scientific character, he did not think it would be desirable to add any non-scientific members to the Committee. The consideration of the administrative or legislative action to be taken would come later.

Mr. Lynch put another question in regard to the proposed Committee. He wished to know whether the Home Secretary would consider it wise not to restrict the question to the means of establishing a standard of illumination, but would so extend the terms of reference as to permit the investigation of a number of other matters of industrial as well as scientific interest. Mr. M'Kenna said the exact terms of reference had not been settled; but it was intended that they should be wide enough to allow the Committee to institute such scientific investigations as might be necessary in order to enable them to advise not only as to standards, but also generally upon the lighting of industrial premises.

Accidents Attributable to Defective Lighting

Mr. Lynch asked the President of the Board of Trade the number of accidents in this country last year attributable to defective illumination, as, for instance, in large factories; how many were due to defective installation or the situation of the illuminant rather than to actual deficiency of illuminating power; and what proportion occurred during the night as contrasted with daylight. The question was answered for Mr. Buxton by the Home Secretary (Mr. M'Kenna), who said it would be impossible to give the figures asked for. The records were not, and could not be, compiled upon such lines. Defective lighting was rarely more than a contributory cause of accident; and, in the absence of any standard, there could be no trustworthy statistical data of the kind.

Decisions under the Unemployment Regulations.

Last Thursday, Captain Murray asked the President of the Board of Trade whether he would consider the advisability of issuing from time to time returns showing the decisions given by the Umpire under the "Unemployment Insurance (Umpire) Regulations." Mr. Buxton, in reply, said that the Umpire's decisions were published weekly in the "Board of Trade Journal" and monthly in the "Board of Trade Labour Gazette." From time to time copies of important decisions were issued, and sent to the persons affected. He proposed to lay upon the Table of the House a return giving a classified list of decisions by the Umpire, and also to take steps to have this list widely circulated.

BIRMINGHAM CORPORATION BILL.

The Chemical Clause Inserted.

HOUSE OF LORDS COMMITTEE.—Thursday, July 4.

(*Before the Duke of* BEDFORD, *Chairman*, *Lord* LONGFORD, *Lord* ZETLAND, *Lord* FALMOUTH, *and Lord* ACTON.)

Clause 12 of the "Omnibus" Bill promoted by the Birmingham Corporation deals with the acquisition of additional gas lands, and has already been passed by a Committee of the House of Commons.* Since the Bill was in the Lower House, however, a petition has been presented against the clause by the United Alkali Manufacturers' Association. It was sought to have the "Chemical Clause" inserted in respect of the gas portion of the Bill.

Mr. HONORATUS LLOYD, K.C., and Mr. JEEVES appeared for the Birmingham Corporation. Mr. J. D. FITZGERALD, K.C., and Mr. MACASSEY represented the Alkali Manufacturers' Association.

Mr. HONORATUS LLOYD, in opening the case for retaining the clause as it stood in the Bill, said the object of it was to authorize the Corporation to acquire and utilize a certain piece of land for the general purposes of the gas undertaking. There was no local opposition. There was, however, a petition by the Alkali Manufacturers' Association; and before he read this, he would tell the Committee exactly how the matter stood. The Association apparently seemed to think that local authorities owning gas undertakings and gas companies were utilizing the powers that Parliament had given them in respect of their residual products in a way which was unfair to the members of the Association. As a matter of fact, it had been the practice in some districts for gas companies who had not sufficient materials to work-up in connection with their own residuals, to buy residuals from other gas companies; and the result had been, so far as he had been able to judge, that the members of the Alkali Manufacturers' Association had not been able to get the refuse from gas-works at their own prices. If the Association was the only market for the refuse, then, of course, they could to a large extent command their own price. On the other hand, if other gas undertakings were also in the market desiring to buy, the price would naturally be higher; and consequently there was a better market. The alkali manufacturers objected to this, and in this session had deposited petitions against nearly every Gas Bill. One Bill (the South Suburban) came quite early in the session before a Committee presided over by Lord Ritchie; and the Committee, having heard the real facts in this particular case, put a clause into the Act for the protection of the Association. Exactly at the same time, another Gas Bill was before a Committee of the House of Commons; and it was intimated to this Committee that the House of Lords Committee were dealing with the South Suburban Gas Bill, and the result was the insertion of a similar clause—the House of Commons Committee stating that it was not to be taken as a general precedent, but that they thought it applicable in this particular case. In the case of Birmingham, he ventured to submit that the clause was totally inapplicable. In the petition, it was generally alleged that gas undertakings were developing the practice of buying and selling their residual products among themselves for the purpose of working them up, and that in this way they were competing with private chemical manufacturers. But it was not alleged that Birmingham was doing this, or had done it; and it being the fact that Birmingham had never done so, he suggested there was no necessity for the clause. Why should a clause which was applicable to people who were doing what was complained of be imposed upon a corporation who were not doing what was complained of? The clause of the Bill now being opposed was verbatim the clause of the Model Bill so far as the material portion was concerned—viz., the last four lines. They read as follows: "and may make, store, and supply gas accordingly, and may manufacture, sell, provide, supply, and deal in, coke, tar, and other residual products or refuse of any materials employed in, or resulting from, the manufacture of gas." The petition of the Alkali Manufacturers' Association further expressed apprehension that the Corporation would, under their existing Acts, in conjunction with the clause in the present Bill, carry on businesses other than the manufacture of gas and the sale of products arising directly from them. If the Corporation did anything unfair or put a wrong interpretation on any of their Acts, those who were wronged had their remedy at law. The Alkali Manufacturers' Association were asking Parliament to insert a clause which would expressly prohibit the Corporation from carrying on their legitimate operations; and he would ask the Committee to give the ordinary provisions of the Model Bill—no more and no less.

Alderman *J. H. Lloyd*, a member of the Birmingham Corporation Gas Committee, the Chairman of the Works Sub-Committee, and a member of the Residuals Sub-Committee, said it was necessary to have the land in question in consequence of the increased demand on the gas undertaking. At the present time, the Corporation did not carry on any business in residuals. The coke they partly used themselves and partly sold. The tar was sold to two Contractors—Messrs. Lewis Demuth and Co. and Josiah Hardman, Limited; while 90 per cent. of the ammoniacal liquor used to go to Messrs. Spence and Co., the balance being taken by Messrs. Chance and Hunt. He explained that these Contractors had works adjoining the gas-works, where they converted the residuals into various chemicals. In 1892, however, Messrs. Brotherton took over the works from Messrs. Spence and Co., and still managed them. Thus, at present, the Corporation sold all their ammoniacal liquor and did not manufacture any chemicals.

Mr. FITZGERALD, in cross-examination, said the object of his opposition was in order to prevent the Corporation from manufacturing chemicals in the future.

Witness said the Corporation did not wish to be prevented from buying residual products from their neighbours, if necessary, in the same way that their Contractors did at present.

Mr. FITZGERALD: Then you want to do what is objected to?

Witness: Yes, under certain circumstances.

With regard to tar, you sell that?—Yes.

Nobody objects to that. With regard to ammoniacal liquor, you sell that?—Yes.

Nobody objects in the least; and therefore what my proposed clause aims at is to prevent you from doing something that you have never done?—I agree.

But it is possible for you to do what other gas undertakings have done—viz., not merely to deal with your own residual products, but to buy residual products from other gas companies and to buy materials from outside your own works altogether and set up in business as chemical manufacturers?—Under certain conditions we might do so—if, for instance, our Contractors broke their lease.

Do you desire to have power to do this?—We do not want to be precluded from doing what our Contractors are at present doing, if occasion arose.

Your position is exactly the same as that of the South Suburban Company and the York Company, in both of which Bills the clause has been inserted?

Mr. HONORATUS LLOYD: No it is not.

Mr. FITZGERALD replied that, if anything, the position was worse for the ordinary chemical manufacturer, because the Corporation could borrow on the credit of the rates and the revenue of a very successful gas undertaking at a low rate and compete severely with the private trader.

Witness said the Corporation wanted to work up their own residuals if they were obliged to.

Mr. FITZGERALD said he did not object to this. His proposed clause did not prevent this at all. He could not understand his clause being objected to unless the Corporation desired to set up in business as chemical manufacturers.

Witness, however, replied that he thought there was power in the Corporation Act of 1883 to work up residuals—both their own and those from other gas-works. Counsel contended that the clause in this Act did not permit the Corporation to purchase residual products from other works; but witness held that the Corporation's Contractors at present had the powers, and it was consequently unfair that the Corporation should be precluded.

Mr. FITZGERALD said he understood that the chemical-works in question belonged to the Corporation, and that for the purpose of dealing with their own residual products they were leased to Messrs. Brotherton. This firm were chemical manufacturers, and could manufacture anything and no exception could be taken; but the Corporation were in a totally different position.

Mr. HONORATUS LLOYD: We are only asking for the Model Clause.

Mr. FITZGERALD: The Model Clause, as you interpret it, will give you the power which I object to.

Mr. HONORATUS LLOYD: If I interpret it wrongly, you have your remedy at law.

Mr. *Corbet Woodall*, in giving evidence, expressed the opinion that there was no occasion for such a restriction as was proposed by Mr. Fitzgerald. It was totally against public interests. His view as to the objectionable character of the proposed clause was that it would affect the seller rather than the buyer. The seller of residual products was usually a small company—too small to afford the cost of installing plant for dealing with their own ammoniacal liquor, and they were too far from alkali-works to make it worth while sending the liquor, owing to the cost of carriage. Consequently, they would be left with it on their hands, and it would become a nuisance to the neighbourhood. It could not be turned into the drains; and if it was allowed to escape over the ground, it would find its way into wells and do damage in that way. He regarded the proposed clause as unreasonable and unfair.

In cross-examination, witness agreed that he had given similar evidence in connection with the South Suburban Gas Bill, and that after an adjournment for two days for the Committee to consult the authorities of the House the clause was put in. Nevertheless, he would oppose every application of this sort with undiminished confidence that the decision was wrong.

Mr. FITZGERALD: The Gas Companies' Protection Association have taken the matter up, and that is why it is opposed?

Witness: Oh, indeed no. I should not speak here if it were not that I thought it was a detriment to the public and an injury to the smaller gas undertakings.

But it is the fact that the Gas Companies' Protection Association have put themselves into communication with the Birmingham Corporation and asked them to resist this proposal.

Mr. HONORATUS LLOYD: It is not so.

Mr. FITZGERALD: Then I withdraw the observation if you say that.

Witness said the Institution of Gas Engineers, of which he was President, had taken the matter up. Every gas company in the kingdom felt very strongly on the matter.

Mr. FITZGERALD, in further cross-examination, referred to the suggested effect upon small undertakings, and asked if there was not a perfectly simple process known as "concentration," which reduced the bulk of the ammoniacal liquor and enabled it to be sent quite cheaply by train. Witness said it was not a simple process applicable to small works. He was not aware that the supply of ammoniacal liquor was so short that it was being imported from abroad. He agreed that the Gaslight and Coke Company did not trade in chemicals. Counsel next pointed out that the Wandsworth Gas Company had accepted the clause without contest, and this did not point to it being injurious to gas companies. What did not injure a large gas company would not injure the Birmingham Corporation.

In re-examination, the fact was brought out that the other Bills which had been referred to involved new parliamentary concessions and not merely a small piece of additional land as in this case.

Mr. *R. G. Shadbolt*, the Engineer, Manager, and Secretary of the Grantham Gas Company, said the proposed clause would remove competition for the purchase of residual products by the members of the Alkali Manufacturers' Association. Thus reduced prices would prevail, which would recoil upon the consumer of gas, as the sale of residual bye-products was an important factor in reducing the cost of gas to the consumer. A proposal of this sort was specially inequitable when the Bill was merely one for purchasing a small portion of land.

In cross-examination, witness admitted that at Grantham all the

* See "JOURNAL," Vol. CXVIII., p. 237.

residual products were sold, and that the Company did not enter into the manufacture of chemicals. In his opinion, however, every gas undertaking should be permitted to do anything which would cheapen the price of gas. Counsel replied that if this argument were to apply, gas undertakings ought to be allowed to manufacture gas-fittings; but this had been expressly prohibited by Parliament.

Mr. FITZGERALD: According to you, the Birmingham Corporation can go all over the country and buy up residual products, and set up in business as chemical manufacturers?

Witness: That is an impracticable proposition, because geographical and other considerations would enter into the question.

Replying to further questions, witness said that the only safeguard that the prices quoted by the chemical manufacturers for residual products were more or less the market prices, was to allow gas undertakings to purchase and work up residual products among themselves; otherwise the gas industry would be at the mercy of the alkali manufacturers, so far as the price of residual products was concerned.

Mr. FITZGERALD next referred to the circular issued by the Institution of Gas Engineers at the time Mr. Shadbolt was President, and witness said that this was sent around because the Institution felt strongly that this argument was inimical to the gas industry and to the gas consuming public.

Mr. FITZGERALD: Lord Ritchie and Lord Barnard both came to the same decision, and inserted the clause. Yet here you are again as if nothing whatever has happened.

Witness: You seem to think that we have no right at all to protect ourselves.

Surely there is some finality in this matter. When the decisions have been given by three Committees in one session to the same effect, and that also in a very large number of cases gas undertakers have accepted these decisions, this should have ended the matter?—The conditions in this case cannot be compared with the others.

Mr. HONORATUS LLOYD said that he had other witnesses; but as it would be mere repetition, he would not call them.

The Committee then adjourned for lunch. On resuming,

The CHAIRMAN said that the Committee were of the opinion that the clause proposed by the United Alkali Manufacturers' Association should be inserted in the Bill.

YORK UNITED GAS BILL.

The Bill promoted by the York United Gas Company was before the Unopposed Bills Committee of the House of Commons on Thursday, and was eventually ordered to be reported for third reading.

Mr. R. H. FOX (Messrs. Durnford and Co, Parliamentary Agents) explained the provisions of the Bill, which was fully reported in the "JOURNAL" for May 7, p. 382.

Some discussion took place with regard to a clause which has been inserted in the Bill giving the Corporation the right to determine the position of any pipes in private streets not yet dedicated to the public use. A clause to this effect was refused by the House of Lords Committee after considerable discussion; but the promoters, who, it will be remembered, have come to terms with the Corporation in respect of possible purchase, now more or less unwillingly put it in, but drew the special attention of the Committee to it, and suggested that it was unnecessary.

Lord ROBERT CECIL (a Member of the Committee) pointed out that it placed the Gas Company under two controls instead of one, as at present, in respect of private streets.

Mr. PRITCHARD (Messrs. Sharpe, Pritchard, and Co., Parliamentary Agents), on behalf of the York Corporation, said that a similar clause was put into the Luton Gas Act of 1911.

Lord ROBERT CECIL said he did not understand what the Corporation had to do with private streets.

Mr. E. MOON, K.C. (the Speaker's Counsel), said that the Corporation would later on have these under their control; and they naturally wished to have notice of what the Gas Company were doing.

Mr. PRITCHARD said that the effect of the clause was that the Corporation would receive notice of all works contemplated by the Company in private streets, together with a plan; and if the parties could not agree as to the position of the pipes, the question would be decided by the Justices under the provisions of the Gas-Works Clauses Act.

The Committee allowed the clause.

In the House of Lords, considerable discussion took place upon the question of purchase; the suggestion that a purchase clause should be inserted in the Bill being strongly fought by the Company. Since then, however, purchase terms have been arranged between the Corporation and the Company, with the result that the following clause has been added to the Bill:

> If the proprietors of the Company shall, at a meeting to be held on the first day of October next after the passing of this Act, approve of the sale of the undertaking to the Corporation on the terms specified in the third schedule of this Act, the Corporation shall, in accordance with, and subject to, the provisions of the Borough Funds Acts, 1872 and 1903, introduce in the next session of Parliament a Bill to empower the Corporation to purchase the undertaking of the Company on the said terms, and *bonâ-fide* promote the same, and the Company shall not oppose such Bill, except in as far as may be necessary in order to secure the insertion therein of provisions to protect their interests with respect to such purchase, and for that purpose the Company shall be at liberty to petition in either or both Houses of Parliament, and to appear on such petition by Counsel, agents, and witnesses, if they think fit.

The following are the terms specified in the third schedule referred to in the above clause:—

> (1) The Corporation to pay to the Company a sum equal to £102 10s. per cent. for the £370,000 ordinary and the £50,000 preference stock of the Company.
>
> (2) The Corporation to pay to the Directors a sum of £5000 in full satisfaction of all claims by them for compensation for loss of office, such sum to be divided amongst such Directors as they may agree.
>
> (3) The Corporation to pay to the officials in the regular employment of the Company who shall not be retained by the Corporation in the same or similar office or employment and at the salary and on the terms and conditions in and on which they respectively were employed by the Company on the first day of January, 1912, compensation (on the Treasury scale) in respect of any loss of office or diminution of salary or income by reason of the transfer of the undertaking to the Corporation, the amount of such compensation (on the Treasury scale) in default of agreement to be determined by arbitration in accordance with the provisions of the Arbitration Act, 1889. But in fixing such compensation in the case of any official who has been less than ten years in the employment of the Company, the arbitrator shall take into account any reasonable offer by the Corporation to continue him in their employment. For the purpose of this clause, the term "officials" shall be deemed to mean the Secretary and Manager, the Solicitor, the Auditors (including the Auditor appointed by the Recorder), the Superintendent of the Works, the Office Staffs, and Collectors of the Company.
>
> (4) The sale is subject to the rights of the holders of debenture stock; and the Corporation shall undertake to discharge all liabilities in respect of the same. The debenture stock of the Company, and the interest accruing thereon, after the date of the transfer shall continue to be a charge on the undertaking in the hands of the Corporation to the same extent, and with the same incidents, as if the transfer has not taken place, and as if the Corporation were substituted for the Company in respect of such debenture stock.
>
> (5) The Company shall not, except with the consent of the Corporation, raise any capital in pursuance of the provisions of this Act prior to the 1st day of August, 1913, save what is necessary for carrying on the undertaking and satisfying existing obligations.
>
> (6) The term "the undertaking of the Company" includes all reserve and other funds, and all the works, engines, mains, pipes and machinery, lands and buildings, plant (fixed and movable), and all other the real and personal property, assets, and effects of whatever nature, and all the rights, powers, and privileges vested in, or belonging to, or had or enjoyed by, the Company at the date of the transfer of the undertaking to the Corporation.
>
> (7) After the date of the transfer, and until the Company shall be finally wound-up and dissolved, the Company shall be entitled to retain the Directors' minute books, the register of stockholders and shareholders, and other books relating solely to the holders of stock or shares in, and to the constitution of, the Company, and shall have access at all reasonable times to the other books, documents, and accounts relating to the transferred undertaking for the purpose of making up the accounts of the Company to the date of the transfer, and for all other reasonable purposes in relation to the winding-up of the Company, and upon the winding-up of the Company the said books retained by them shall be handed to the Corporation.
>
> (8) In addition to the amount to be paid by the Corporation to the Company under the foregoing provisions, the Corporation shall pay to the Company the taxed costs, charges, and expenses of obtaining this Act and of procuring any amendment of the Bill to be introduced by the Corporation in the next session of Parliament, and also of, and incident to, the transfer of the undertaking and the winding-up of the Company.
>
> (9) The undertaking of the Company shall be transferred to the Corporation within six months after the confirmation of the purchase by Parliament.
>
> (10) The Company shall be entitled to retain, or shall be paid by the Corporation, in addition to the price or consideration for the transfer of the undertaking, such a sum as shall be necessary to enable the Company to pay dividends at the authorized rates from the date of the last payment of such dividends to the date of the transfer of the undertaking to the Corporation.
>
> (11) The Corporation shall also pay and discharge all the obligations and liabilities of the Company existing at the date of the transfer of the undertaking to the Corporation.

WAKEFIELD GAS BILL.

The Unopposed Bills Committee of the House of Commons reported this Bill for third reading on Thursday.

There has been no amendment in the Bill since it was passed by the House of Lords Committee (see "JOURNAL" for May 7 and 14).

Mr. JOHNSON (Messrs. Torr and Co., Parliamentary Agents), in reply to a question by Lord ROBERT CECIL, said that it was proposed to form a co-partnership scheme under the Bill.

CHRISTCHURCH GAS BILL.

This Bill, which has already passed the House of Lords, where there was some opposition,* was passed by the Unopposed Bills Committee of the House of Commons on Thursday, and ordered to be reported for third reading.

Mr. PRITCHARD (Messrs. Sharpe, Pritchard, and Co., Parliamentary Agents) explained the provisions of the Bill, and referred to a Local Government Board report which drew attention to the price. He explained that the present maximum price is 6s. 6d. per 1000 cubic feet; but under clause 30 of the Bill this is to be reduced to 5s. in the

* See "JOURNAL," Vol. CXVIII., p. 385.

borough of Christchurch, and 5s. 6d. in the outside districts, with the proviso that when the Company's proposed new works are erected the price is to be 5s. throughout the whole limits of supply. These prices have been agreed with the Corporation of Christchurch and the Rural District Council of Lymington.

Mr. *W. Cash*, the Secretary of the Company, handed in tables to justify these prices, which he maintained were reasonable. On the 10 per cent. stock the Company were now only paying 5 per cent., and on the 7 per cent. stock £3 10s per cent.; the price of gas having gone down from 4s. 9d. in 1903 to 4s. 2d. at present.

Mr. *Harry Woodall* justified the new capital of £30,020. He said that during the past eight years the consumption of gas had been increasing at the rate of nearly 9 per cent. per annum; and an even larger rate of increase was anticipated in the future, because of the new area now being taken in. The estimated capital expenditure was upon the basis of £1000 per million. He anticipated that the Company would have to come back to Parliament in less than fifteen years.

In reply to the CHAIRMAN, witness said there was competition from electric light in Christchurch, but not in the outer area. The electricity was supplied by a Company.

Replying to further questions by the Committee, witness said that the total capital under the Bill was £40,000, in addition to £6000 existing capital not yet raised, which practically doubled the capital already issued. It was the intention later on to give up the existing works and build new ones, for which land had already been purchased. The present works were in the centre of Christchurch, and all coal had to be carted right through the town. It was in connection with the new works that the comparatively large amount of capital was required, while another factor in this connection was the long lengths of mains which would have to be laid.

The clause which was the subject of some discussion in the House of Lords, modifying the provisions of the Gas-Works Clauses Act, 1847, as a result of the case of *Schweder v. Worthing Gaslight and Coke Company*, has been deleted from the Bill—it being the opinion of the authorities of the House that a similar case in future is very improbable.

HERNE BAY GAS BILL.

The Unopposed Bills Committee of the House of Commons had before them last Thursday the Bill promoted by the Herne Bay Gas Company. Authority is sought in the Bill to increase the Company's capital by £10,000, to create a special purposes fund and a reserve fund, and to place the Company upon a sliding-scale basis. The measure has already passed the House of Lords.*

Attention was called by the Committee to clause 13, which permits the creation of a reserve fund, inasmuch as this differs from the usual wording of the reserve-fund clause in the Model Bill. Under the latter a reserve fund can only be formed where the profits exceed the standard dividends. In the Bill it is asked that, no matter what dividends are paid or payable, the Company may form a reserve fund.

Mr. PRITCHARD (Messrs Sharpe, Pritchard, and Co., Parliamentary Agents) reminded the Committee that a reserve fund was formed out of divisible profits, so that it only affected the shareholders. Under the proposal in the Bill, it would mean that the Directors could, instead of dividing all their profits as dividends, place a certain proportion of them to the reserve fund, irrespective of whether the amount divisible was in excess of the maximum dividends permissible.

Mr. E. MOON, K.C. (the Speaker's Counsel): It extends the operation of your self-denying ordinance.

The CHAIRMAN: Is this the first case of the kind?

Mr. PRITCHARD: I do not know of any precedent for it.

Mr. MOON: Are you a sliding-scale Company?

Mr. PRITCHARD: It is proposed to make the Company a sliding-scale Company under the Bill.

Mr. *W. Cash*, the Secretary to the Company, said that the effect of the clause would be something like this: Under the clause in the Model Bill, supposing the standard dividend was 10 per cent., and the price of gas 3s. 6d., if the price were reduced to 3s. 4d., another ½ per cent. dividend could be paid, and this ½ per cent., under the Model Clause, might be allocated to reserve; whereas supposing the price remained at 3s. 6d., and the dividend payable was 10 per cent., there was no excess, and though the Directors of the Company might think it a wise precaution to put something to reserve, they could not do so. Under the clause now proposed, however, they could.

Lord ROBERT CECIL (a Member of the Committee) asked if this would not affect the price charged.

Witness: No; it comes out of the shareholders' profits.

The CHAIRMAN said that the real result seemed to be the equalization of dividends, in case in any one year there might be a coal strike, or anything of that sort, which would form an extraordinary charge against the revenue account. It seemed clear that it would not hurt the consumer; and the Committee would pass the clause.

Witness, referring to the price, explained that the present maximum price was 4s. 2d.; but the standard price now proposed, and which was agreed with the Herne Bay District Council, was 3s. 6d., with a neutral zone between 3s. 6d. and 3s. 8d. The present price was 3s. 6d., and the Directors had really been working on the basis of being a sliding-scale Company in the past—although the Company were not—inasmuch as the price was reduced as the dividend increased.

The preamble of the Bill was proved; and it was ordered to be reported for third reading.

* See "JOURNAL," Vol. CXVIII., p. 452.

We have received from James Keith and Blackman Company, Limited, two pamphlets (Nos. 15 and 22), describing the open Keith fan—a new method of ventilation—and the Keith electric plenum ventilators. The former has been designed for working without any casing; and the latter can be installed in a window, on a column, in an apartment, or in a railway carriage or tramcar.

ASHBORNE URBAN DISTRICT GAS BILL.

The Bill promoted by the Ashborne Urban District Council, which has already passed in the House of Commons [see "JOURNAL," Vol. CXVIII., p. 386], was before the Unopposed Bills Committee of the House of Lords last Tuesday, and has now been reported for third reading.

Mr. H. R. CRIPPS (Messrs. Dyson and Co, Parliamentary Agents) presented the Bill. There was no discussion upon it; but an amendment, suggested by Counsel to the Lord Chairman, was subsequently discussed privately. This, we learn, had reference to clause 21—"Power to Supply Gas-Fittings, &c." After discussion, the clause has been inserted in the Bill in the following terms:—

1.—The Council may purchase, sell, let for hire, fix, repair, and remove, but shall not manufacture, engines, stoves, ranges, pipes, and other gas fittings for lighting, motive, heating, ventilating, cooking, or any other purposes, and may provide all materials and work necessary or proper in that behalf, and with respect thereto may demand and take such remuneration or rents and charges, and make such terms and conditions as may be agreed upon.

2.—The Council may enter into contracts for the execution of any of the powers of this section, and shall not themselves lay any pipes on the consumer's premises except between the main of the Council and the consumer's meter, nor shall they sell any such gas-fittings as aforesaid except through a contractor.

3.—Any fittings let for hire under the provisions of this section shall not be subject to distress or to the landlord's remedy for rent, or be liable to be taken in execution under process of any Court or proceedings in bankruptcy against the person in whose possession the same may be.

4.—Subject as hereinafter provided, all such fittings let for hire as aforesaid shall, notwithstanding that they be fixed or fastened to any part or any premises in which they may be situate, or to the soil under any such premises, at all times continue to be the property of, and removeable by, the Council. Provided that nothing in this subsection shall affect the amount of assessment for rating of any premises upon which any such fittings are or shall be fixed.

5.—The Council shall only be entitled to the privileges and exemptions conferred by this section in respect of such fittings as shall have upon them respectively a sufficient mark or brand indicating the Council as the actual owners thereof.

6.—Provided as follows:

(*a*) The Council shall so adjust the charges to be made by them for any such fittings, or for the fixing, repairing, or removal thereof, as to meet the sum properly chargeable for the costs and expenses incurred by them under the powers of this section in connection therewith (including interest upon moneys borrowed for those purposes and all sums applied to sinking fund for repayment of moneys so borrowed);

(*b*) The sums properly chargeable and received by the Council in connection with the purposes in this section mentioned in each year (including interest and sinking fund) shall be separately shown in the published accounts of the gas undertaking of the Council for that year;

(*c*) Every sum charged by the Council in respect of the provision of such fittings, or the fixing, repairing, or removal thereof, shall be separately stated on every demand note delivered by the Council to the consumer.

HOUGHTON-LE-SPRING DISTRICT GAS BILL.

This Bill was before the Unopposed Bills Committee of the House of Commons (and ordered for third reading) last Thursday. The House of Lords have already passed the Bill, the objects of which were given in the "JOURNAL" for May 21, p. 529.

Mr. *H. Woodall* explained that two years ago new Directors came into office, and pursued a rather vigorous policy, with the result that a very large number of new consumers were obtained, and as many as 1300 prepayment consumers were now waiting to be connected. This accounted for what the Committee had termed rather large capital powers—namely, a total of £41,666, which included, however, £4300 overspent capital. He admitted that the price—4s. 6d. per 1000 cubic feet—was comparatively high; but it was more or less on a level with the prices in surrounding districts, and was accounted for by expenditure due to leakages caused by subsidences.

Mr. E. MOON, K.C. (the Speaker's Counsel), called attention to the fact that the clause relating to the special purposes fund did not follow that in the Model Bill, and, as a matter of fact, gave the Directors unlimited powers in the amount they could allocate to the fund, whereas under the Model Bill it could not exceed one year's dividends.

Witness said that the Company were asking for the clause in the form in which it appeared in the Bill, for the reason that the area of supply was in a mining district, and when the mines were worked out, it could very well happen that the gas business would be gone, as the population would leave.

Mr. MOON replied that it really meant that the price of gas was being kept up to the extent of the amount which was placed to the special purposes fund; and witness agreed with this. Mr. Moon also said that if the Company accumulated a large reserve fund of this character it would seriously affect the purchase-price the Local Authority would have to pay for the undertaking if they ever wished to purchase.

The CHAIRMAN said the Committee could not agree to the clause. It was only a few years ago that, as a concession to the gas companies, these reserve and special purposes funds had been allowed, and he did not think they could go beyond that now. Therefore the clause must be the same as that in the Model Bill.

LEGAL INTELLIGENCE.

Election of Directors of the Maidenhead Water Company.

Last Wednesday, in the Chancery Division of the High Court of Justice, Mr. Justice Parker heard a summons taken out by the defendants in the action of *Coath v. Cox and the Maidenhead Water-Works Company*, asking that the statement of claim might be struck out on the ground that it did not disclose any cause of action. The plaintiff, who holds 21 of the Company's £10 shares, and purported to sue on behalf of all the other shareholders, claimed a declaration that certain of the Directors were not legally appointed, inasmuch as only thirteen instead of fourteen days' notice was given of the meeting at which the Directors were re-elected. During the hearing, it transpired that a meeting of the Company would be held on the 1st prox , of which proper notice would be given, when all the Directors would come up for re-election, and be re-elected. As plaintiff was the only objector, his Lordship said he thought that the better plan would be to stay all further proceedings until after the meeting had been held.

Cutting Off a Gas Supply at Colne.

In the "JOURNAL" for the 14th of May last (p. 455), a case was reported in which a tradesman at Colne claimed damages from the Corporation for having unlawfully cut off his supply of gas. The County Court Judge gave judgment for the plaintiff for £4, with costs; but the Town Clerk (Mr. A. Varley) submitted that he had no jurisdiction in such a case. His Honour acknowledged that the point was important; and he said he would reserve his decision till the next Court day. At a recent meeting of the Town Council, the Clerk reported that the Judge had since informed the Registrar that, on further consideration, judgment must be entered for the defendants.

Unlawfully Connecting a Gas-Meter.

At the instance of the Commercial Gas Company, Mary Thomas, of Beaumont Street, Mile End, was summoned at the Thames Police Court last Saturday for unlawfully connecting a gas-meter without giving the required notice. Mr. Young said Mrs. Thomas's husband was a bankrupt, and she traded in her own name as a milk vendor. A sum of money was owing to the Company for gas consumed. After due notice had been given, the gas was cut off; and, in consequence of what was seen by a collector, an examination was made, and it was then found the meter had been connected by means of white lead. The work had been imperfectly done, and it was fortunate that an examination had taken place, or the consequences might have been serious. The arrears due to the Company had now been paid, and the gas connected. Defendant said a collector had given her to understand that time had been allowed her by the Company. She called a man in, and he made the connection with white lead. She was fined 20s., with 23s. costs.

Infringement of a Registered Mantle Name.

Before the Birmingham Stipendiary Magistrate last Tuesday, the Provincial Incandescent Fittings Company, Limited, of Thomas Street, Manchester, were prosecutors in a case of infringement of a brand of incandescent mantles known under the registered name of "Dazlite." The defendants were Messrs. A. Etheridge and Sons, Limited, of Dudley Street, Birmingham. Mr. Sandlands, who prosecuted, explained that on Feb. 12 of the present year a representative of his clients saw a dozen mantles purporting to be "Dazlite" in a shop at Aberdare, and on inquiry found that they had been obtained from Messrs. Etheridge and Sons. On visiting the defendants' premises, this representative saw a mantle labelled "Dazlite" in the window. The Company then obtained a search warrant, and found on the premises 350 boxes, each containing half-a-dozen mantles so marked. The Company asked the defendants for the name of the firm from whom the mantles came; but the defendants would not make any statement about the source of supply. Under the Merchandize Marks Acts, the Magistrate had power to prohibit the importation of these mantles. They were cheaper than the English-made mantles, and encouraged the shopkeepers to give a preference to foreign goods. The Company also asked for an order for the destruction of the mantles discovered on the defendants' premises, and for substantial costs to cover the expenses of the case. The defendants pleaded guilty, and consented to an order for the destruction of the goods. Their Solicitor explained that the firm did not know the name was a registered one, and had only bought 30 gross of the mantles bearing this trade mark. The Magistrate inflicted a fine of £5, with £3 3s. costs on each of two summonses, and made the desired order.

Oldham Gas Workers Demand for Increased Pay.—The Oldham Gas Committee have had under consideration at a special meeting an application on the part of several grades of workmen for an increase in wages and concessions as to holiday pay. In the application put forward, an advance of 5d. per shift was asked for shiftmen, ½d. per hour increase for yardmen and other labourers, a week's holiday, with pay, per year for all classes of workmen, payment of double time in all cases where such is not now paid for work on Christmas Day and Good Friday, and single pay if not working. There was also an application from the main and service layers for an increase of ½d. per hour. The Committee could not see their way to entertain the demand made by the main and service layers and shiftmen. With regard to the other applications, it was decided that, as they affect several other departments of the Corporation, they should be dealt with collectively by all the Committees concerned.

MISCELLANEOUS NEWS.

BRADFORD CORPORATION GAS DEPARTMENT.

Annual Report of the Engineer and Manager.

The Gas Engineer and Manager of the Bradford Corporation (Mr. Charles Wood) has presented to the Gas Committee his report on the working of the gas undertaking in the twelve months ended the 31st of March. It is accompanied by an analysis of the gas accounts, compared with those for the preceding year.

Mr. Wood opens his report with an expression of pleasure at its satisfactory nature. But for the unfortunate national coal strike, the results would, he says, have been even more favourable than those presented; and the profits would have been an easy record since the last reduction made in the price of gas eight years ago. During the year, the wages of almost every class of workman were advanced, and in many cases the work was reduced; while the cost of nearly every kind of material went up. The Committee were again very fortunate in placing their coal contracts; being able, by purchasing just at the right time, to secure more than a year's requirements at a slight average reduction of price, instead of the advance of from 4d. to 1s. per ton which was generally paid for gas coal. Mr. Wood says it is gratifying to know that the Committee have still 80,900 tons of this cheap coal to come in, and have as well 33,000 tons in stock, when 2s. and 2s. 6d. advances are being asked for the present year's contracts.

In accordance with the usual practice, the cost of all new services and all repairs and renewals to plant except the vertical retorts at Thornton Road has been charged directly to revenue. Interest and sinking fund charges upon the goodwill of the added gas undertakings cost upwards of £18,000. The benefit to the gas consumers by the reduced gas charges in these areas amounted to £14,521.

The total quantity of gas produced during the year was 2,148,225,000 cubic feet—being an increase of 10,223,000 cubic feet, or 0·47 per cent., compared with the year 1910-11. The gas sold, including 167,429,000 cubic feet used in the public lamps, amounted to 2,003,418,000 cubic feet—being a decrease of 0·03 per cent. There would have been an increased sale of 1¼ per cent. but for the reduced consumption in March due to the closing of works on account of the coal strike. Mr. Wood gives a table showing the quantities of gas sold in the different districts during the year ended Dec. 31 last, and for the preceding year. For purposes of comparison, the figures for 1899 are also given; this period being prior to the taking over by Bradford of the North Bierley, Clayton, Eccleshill, Idle, and Heaton districts. There were increases in five and decreases in three of the districts.

During the year, 206,834 tons of coal and cannel were carbonized; 6·92 per cent. of cannel being used, against 5·31 per cent. in 1910-11. The average cost of the coal was 10s. 9·53d. per ton; the previous figure being 10s. 7·52d. There were 298 lbs. of coal carbonized per retort charged; and the average quantity of gas made per ton of coal was 10,386 cubic feet—being 55 feet less than last year. Mr. Wood explains that the extra proportion of cannel and the extra cost of coal (which includes the cost of stocking and removing from stock), as well as the smaller yield of gas, were all due to the coal strike necessitating the use of coal and cannel from stock from December to March. The results are, he says, much better than could have been expected, seeing that some of the coal had been in stock for ten to fifteen years.

Dealing with the revenue account for the year, Mr. Wood says the total salaries for manufacture, distribution, and management amounted to £5823, or an increase of £108; carbonizing wages absorbed £30,978, or an advance of £2073; coal cost £111,631, or £2825 more; and the expenditure on purification was £3860—a decrease of £351. The sum of £28,076 was spent on the repair and maintenance of works; being £691 more than in the year 1910-11. The repairs to mains and services, including the cost of new services, amounted to £6860—an increase of £1837. This increase was due to the extra cost of wages and materials (some items of the latter having risen 40 per cent. in price), to the larger number of new services, and to the replacement of old services in the added areas. A sum of £1764 was spent on the repair and maintenance of meters, or £1095 more than before. This increase was caused by the Committee having taken the opportunity of writing-off a considerable amount for depreciation of meters, chiefly in the added districts. Meter inspection cost £3908, or an increase of £303. The Finance Committee's charges for administration and collection of accounts were £1700—the same as for several years past. The miscellaneous expenses amounted to £907—an increase of £60. Stationery cost £469, or £37 less; and bad debts, which amounted to £907, show a decrease of £450, which Mr. Wood regards as a satisfactory reduction. The amount paid for rents (principally ground rents) was £701, or £5 more than before. A sum of £14,214 had to be paid for rates, or £489 less than in 1910-11. The stove department cost £3601; but the revenue from it was £3852—leaving a balance of profit of £251, against £123 before.

The following are the main items of income: £192,338 was received for gas—a decrease of £534. Meter-rents amounted to £2683, or £43 more. Coke yielded £39,483, or £221 more. Mr. Wood points out that this figure would been been several thousand pounds higher if the Committee had sold coke at market prices during the coal strike. Tar brought in £15,809, or an increase of £2238; and ammoniacal liquor produced £22,251—an increase of £1797. From the sale of spent oxide to the chemical-works the Committee had £2282, which was £714 less than before. The cost of coal less residuals (excluding profit on the chemical-works) was £34,088; being £1430 better than in the year 1910-11. Purification, less the revenue from spent oxide, cost £1578, or £364 more. Rents received amounted to £1084, or £2 less. The gross profit on the chemical-works, including the profit on the sale of ammoniacal liquor, was £4531, against £3610 in the preceding year.

The gross profit for the year amounted to £68,912; being £3584 less than for 1910-11. Interest on loans, &c., amounted to £28,172—a

decrease of £1657. Income-tax was £705 more, due to greater profits; while the sinking fund contribution of £27,549 shows an increase of £683. The net profit is thus £9618, or £3316 less than before.

During the year, there was spent on capital account the sum of £10,494, made up of £1117 on new mains and £9377 on the vertical retort installation at Thornton Road. The total capital expenditure up to the end of the financial year was £1,194,126, of which £460,714 has been repaid.

A sum of £27 500 was received last year towards the cost of street lighting. The amount paid for gas used worked out at 1s. 3d. per 1000 cubic feet, compared with 1s. 3½d. before.

The principal items of the working results are given in the tables appended to the report. Mr. Wood points out that the coal trouble is responsible for the slight falling-off on several points. He says the only item that needs comment is the increase of 0·5 per cent. in the unaccounted-for gas. He explains that this is really the difference between the quantity of gas made at the works, as registered by the station meters, and the total registered by the consumers' meters, together with the quantity used in the public lamps. It is made up of condensation, amounting to from 1 to 1½ per cent., which is always greater during severe changes of temperature; loss by consumers' meters, which is at least 2 per cent. on the average (all to the benefit of the consumer); and the actual leakage due to corrosion and fractures of mains and service-pipes. Mr. Wood says there is no doubt that leakage proper is increasing throughout the country, and that it is due to two reasons—first, the higher pressures now used to obtain greater lighting efficiency; and, secondly, the heavier motor road traffic, causing vibrations and disturbances of the pipes in main roads. The average cost of the gas per 1000 cubic feet in the holders rose last year from 10·185d. to 10·229d. The average illuminating power of the gas supplied during the year was 17·35 candles (an increase of 0·3 candle), as officially tested. But Mr. Wood says it must be remembered, when comparing the results with others, that the Act of Parliament requires in Bradford a certain old type of burner to be used. When tested by the new "Metropolitan" No. 2 argand burner, Bradford gas has an increased value of more than 3 candles.

The following are some of the items from the working statement for the past year; the figures for 1910-11 being given for comparison:—

	1910-11.		1911-12.
Coal and cannel carbonized, tons . . .	204,765	..	206,834
Gas made, thousands of cubic feet . . .	2,138,002	..	2,148,225
,, per ton of coal, cubic feet . .	10,441	..	10,386
,, per retort charged, cubic feet .	1,430	..	1,385
Retorts charged.	1,494,682	..	1,550,475
Gas accounted for, thousands of cubic feet	2,004,042	..	2,003,418
,, ,, per ton of coal, cubic feet	9,787	..	9,686
,, ,, per cent. on make . .	93·74	..	93·26
Coke and breeze saleable, tons	89,474	..	90,101
,, ,, per ton of coal, cwt. . .	8·73	..	8·71
Tar made, tons.	12,509	..	12,831
,, per ton of coal, gallons . . .	11 91	..	12·09
Liquor made, tons	27,412	..	26,853
,, ,, per ton of coal, gallons . .	29·25	..	28·36

The analysis of the accounts shows that the net cost of gas was £123,426, or at the rate of 14·786d. per 1000 cubic feet of gas sold, compared with £120,375, or 14·416d. per 1000 cubic feet sold, in 1910-11. The net profit last year, as shown above, was £9618, compared with £12,934 before; the rates per 1000 cubic feet of gas sold being respectively 1·152d. and 1·549d.

BELFAST CORPORATION GAS UNDERTAKING.

The Past Year's Working.

At the Meeting of the Belfast County Borough Council on Monday last week, the minutes presented by the Gas Committee contained the annual report of the Committee, together with the accounts of the gas undertaking for the year ended the 31st of March last. The gross profit on the manufacture and sale of gas and residuals was £69,341; being an increase of £4773 on the previous year. Adding bank interest, and deducting the cost of the working of the stoves department, there was left a sum of £69,323. From this had to be deducted the dividends and interest on capital (£12,767), and the equivalent of interest on the redeemed stock (£4091), £16,858, leaving a net profit of £52,465, or an increase of £5908 on the amount for 1910-11. Adding the balance brought forward, £24,888, there was produced a total of £77,353 at the credit of the profit and loss account. Out of this the following sums have been set aside: Sinking fund, £7444; reserve for insurance of works (two years), £3200; contingent renewal fund (two years), £6000; reserve fund, £20,000—making a total of £36,644, and leaving a balance of £40,709. Out of this the Gas Committee have contributed for public purposes the following amounts: Finance Committee, in aid of rates, £10,000; dividends and sinking fund on the new City Hall stock, £11,356—making together £21,355, and leaving a balance of £19,353 at the credit of the profit and loss account.

The working statements included in the accounts show that, under the supervision of Mr. James D. Smith, the Gas Engineer and Manager, 103,148 tons of coal and 2,482,995 gallons of gas oil were used in the production of 1,224,282,000 cubic feet of coal gas and 1,114,241,000 cubic feet of water gas—a total of 2,338,523,000 cubic feet; being 54,874,000 cubic feet, or 2·34 per cent., more than in the year 1910-11. Of the total quantity of gas made, 2,163,420,000 cubic feet were sold, or 92·512 per cent. The make per ton of coal was 11,869 cubic feet. The residuals produced were: Coke and breeze, 63,392 tons; tar, 1,210,880 gallons; and ammoniacal liquor, 2,463,000 gallons—being respectively 12·291 cwt., 11.739 gallons, and 23·878 gallons per ton of coal.

Alderman CRAIG, the Chairman of the Gas Committee, in moving the adoption of the minutes, said the accounts of the gas undertaking for the year ended the 31st of March last had been before the Committee during the past month; and he was pleased to say that the result of the year's work was of a very satisfactory character. The gross profit amounted to £69,323, which was within £170 of their record of 1906; but the cost of coal since then had increased 1s. 8d. per ton, which was equal to £8600. The Committee had also increased the discounts to gas consumers, which was equivalent to a further sum of £17,750; and, without taking into consideration the advance in the price of other materials, this showed that the cost of working had now been reduced to the extent of upwards £26,000 per annum. This was certainly due to more up-to-date methods of working, as the men had had a considerable advance in their standard wages since that period. In the revenue account, dealing first with the coal-gas section, there had been an increase of £671 in the cost of coal; the quantity carbonized being 103,148 tons. This was 1994 tons less than before; but, owing to the coal strike, they had to pay about £2600 extra. There had also been an increase of £195 in the cost of carbonization; but against this their make of coal gas had been augmented by more than 21¾ million cubic feet. Compared with the cost for the previous year, after making allowance for the advanced price of coal, this meant a saving of £2964 in the cost of working, and, compared with 1909-10, a saving of £8570. There had been a decrease of £1793 in the cost of purification; but, taking into consideration the increase in the make of gas, it actually meant a saving of £1879. Comparing it with the year 1910, the saving amounted to £3954. In the water-gas section, there was an increase in the make of 33 million cubic feet. The cost had gone up slightly, owing principally to the advance in the price of coke, and an increase in the quantity of oil used per 1000 cubic feet of gas made. The cost of purification, however, had decreased. The total make of gas for the year was upwards of 2338 million cubic feet; and the cost in the gasholder £164,513. Here, owing to the economy resulting from the improved methods of working introduced by their Engineer, there was a saving of £1596, notwithstanding the advance in the cost of coal; and, compared with 1909-10, after allowing for a reduction of £5800 in the cost of oil, there was a clear saving of £10,500. Turning to the credit side of the account, the sale of gas through ordinary meters was 1695 million cubic feet—an increase of 30½ millions, and a net increase in the revenue of £1443. Through prepayment meters the Committee sold 270 million cubic feet—an increase of 32½ millions, amounting to £3848. During the year they sold 66,553 tons of coke and breeze, for which they received £54,369, after deducting cost of labour and cartage—an advance of £1556. There was a decrease in the make of tar amounting to £305, and an increase in the make of ammoniacal liquor—for which they also received a better price—amounting to £838. Thus, on the whole, they had an increase of more than £2000 from their residuals. In the stoves department they had had a very successful year; the cost of working having been reduced to the extent of £506. In the month of September they had an exhibition of gas cooking and heating appliances and incandescent lighting, during which they disposed of 1355 heaters, cookers, and other appliances. In January they opened show-rooms, which should prove a great convenience to the gas consumers. During the year they hired-out 1782 cookers and 1071 heaters, and sold 691 cookers and heaters. This made a total of 10,980 cookers and 5487 heaters on hire, and 5903 cookers and heaters sold outright—a total of 22,370 stoves. In the profit and loss account, after paying dividends and sinking fund, they had set aside to the reserve fund £20,000; insurance of works, £3200; and contingent renewal fund, £6000. They had also contributed £10,000 to the general purposes fund in aid of the rates, and £11,355 for the dividends and sinking fund of the new City Hall—a total of £21,355; and they carried forward the balance of £19,353. In the capital account they had made some alterations in accordance with the financial report prepared by the Engineer and Mr. Creighton (the Collector and Cashier). They had written off expenditure the sum of £31,240, this being the cost of buildings and plant which had been removed, and £7836 for old meters sold as scrap. They had also re-arranged the capitalized profits account, so that the items appeared as reserves for the different accounts for which they were originally set aside. During the year they had expended on new mains and services £4808; on account of vertical retorts, £4833; on the Gas Bill, £977; on new meters, £2027; on the prepayment system, £3935; and on stoves, £4091—a total of £20,671. He was pleased to say that the Gas Bill promoted by the Corporation had received the Royal Assent, and was therefore now on the Statute Book. The Bill, when first proposed, met with strenuous opposition from some of the surrounding property owners; but, after a meeting with the persons concerned, matters were satisfactorily arranged, and it went through as an unopposed measure. The powers conferred by the Act would help the Committee to provide a cheap and efficient supply of gas to the consumers, and would be of great use in the development of the gas undertaking.

Mr. DORAN seconded the motion.

The CHAIRMAN (Alderman Sir James Henderson) said the figures submitted by Alderman Craig were most satisfactory; and he thought the Committee and the officials of the Gas Department deserved the greatest credit for the success that attended last year's working.

Mr. GILLILAND inquired if there had been any increase or diminution in the amount of leakage from the mains. Personally he thought there had been an increase, owing to the increased weight of the traffic in the streets.

Mr. J. JOHNSTON said none of the Managers of the gas-works had done better than Mr. Smith, the present Manager.

Mr. RIDDELL having also congratulated the Manager upon the result of the year's working,

Alderman CRAIG, in reply to Mr. Gilliland, said the leakage of gas during the year had amounted to about 1¼ per cent.

The motion was carried.

The employees of the Gorleston and Southtown Gas Company had their annual outing on the 1st inst. in London; a very enjoyable day being spent. Thanks were accorded to the Chairman and Directors for their liberality; to the Manager (Mr. J. Witten), who was unable to be present, for arranging the outing; and to the foreman (Mr. W. Poll), for carrying out the secretarial work in connection with it.

SOUTHPORT CORPORATION GAS UNDERTAKING.

Details of the Past Year's Working.

In his report to the Southport Corporation Gas Committee on the working of the undertaking during the past financial year, Mr. John Bond, the Gas Engineer, states that the sale of gas increased by 7,495,000 cubic feet, and that residuals realized £1573 more than was the case in the preceding year. The prepayment system of gas supply now amounts to 12·5 per cent. of the whole consumption, and shows an increase of 9 1 per cent. on the previous year. Of the total gas supplied through ordinary meters, the Southport consumption in the past year was 334,047,000 cubic feet, equivalent to 80·56 per cent.; the Birkdale consumption was 60,425,800 cubic feet, representing 16·74 per cent.; and the remaining 11,194,400 cubic feet, or 2·70 per cent. was consumed in the Ainsdale, Banks, and Scarisbrick districts. For the previous year, the figures were as follows: Southport, 330,940,800 cubic feet, or 80·42 per cent.; Birkdale, 70,739 200 cubic feet, or 17·19 per cent.; Ainsdale, Banks, and Scarisbrick 9,832,800 cubic feet, or 2·39 per cent.

The total receipts for the past year for gas supplied to private consumers in Southport amounted to £49,468. In Birkdale the revenue from the same source was £13,164, and the rebate amounted to £2678. The average price received for all gas supplied was 2s. 6 7d. per 1000 cubic feet. Owing to the national coal strike, Mr. Bond says the working expenses were somewhat heavier than they otherwise would have been. The high-pressure lighting plant installed at the Eastbank Street department in January last has given entire satisfaction. Mr. Bond adds: "It is pleasing to know that there are 72 high-pressure lamps connected to this plant; representing a total candle power of 66,000. I can with confidence recommend the Committee to instal a much larger plant in the near future."

As to the financial position of the gas estate, Mr. Bond says it continues satisfactory. The capital employed was the same as in the previous year. The total amount expended per 1000 cubic feet of gas sold was 11s. 5d. for the year 1911-12, and 11s. 7d. for the year 1910-11; while the capital outstanding per 1000 cubic feet of gas sold was 7s. 3d. and 7s. 6d. respectively. The net profit on the past year's working was £17,887. Mr. Bond remarks: "As it is thought desirable (after paying the £13,000 in aid of rates) that the balance of £5447, together with £559 brought forward, should go towards the further liquidation of the reconstruction account, when so applied this account would then show the small sum of £47 still to be paid off."

The capital account (total amount expended) now stands at £300,029, and the gas-works debt, after deducting payments through the sinking fund, at £189,875, apportioned as follows: 3 per cent. stock, £81,555; 3½ per cent. stock, £5000; and loans, £103,320.

For the year ended March, 1911, the quantity of gas sold was 2,052,000 cubic feet more than in the previous twelve months; and the net profit was £13,400, of which £13,000 was used in relief of the rates.

STOCKTON CORPORATION GAS UNDERTAKING.

Important Extension Scheme.

At the Meeting of the Stockton-on-Tees Town Council last Tuesday, the Gas Committee reported that they had considered the question of extending the gas-works so as to provide for additional carbonizing plant which will shortly be required. The Committee had had before them a report by the Engineer and Manager (Mr. William Ford), stating that the site of the present works is not well adapted for further extensions, especially in regard to the carbonizing department; and to enable them to carry out such additions as would be a reasonable provision for from ten to twenty years, he advised the purchase of the old rivet-works adjacent, if they could be secured on fair terms. Here an up-to-date carbonizing plant of 1¼ million cubic feet per day capacity, with sufficient area for duplication, could be erected on the vertical retort principle, which, in his opinion, would not only pay its due proportion for interest and redemption, but would produce favourable results to gas consumers and ratepayers alike, and also provide coal storage equivalent to all the requirements of carbonizing plant of 2½ million cubic feet per day. On the site of the present No. 2 retort-house Mr. Ford suggested that the carburetted water-gas plant should be duplicated, including a set of four purifiers for dealing with the gas produced. This would materially assist in prolonging the life of the present purifiers. During the past two years the increased make of gas has been considerable—viz., 47,285,000 cubic feet; and if this rate of increase is continued during the next two years, additional carbonizing plant, with a safe reserve margin, will be essential for the provision of an efficient supply of gas within the parliamentary area. Mr. Ford submitted the following approximate estimate of the additional capital required:

Land purchase	£2,500	0	0
Boundary wall, bridge, foundations, railway extension, &c.	1,400	0	0
1¼ million retort-house and bench, with elevators and conveyors, &c.	19,500	0	0
¾ million carburetted water-gas plant	3,500	0	0
Four purifiers, 20 feet square, when required, say	1,800	0	0
Extensions to sulphate plant, new still saturator and sulphate store, &c.	650	0	0
	£29,350	0	0
Contingencies	650	0	0
Total	£30,000	0	0

The Chairman of the Gas Committee (Alderman J. Harrison) moved that the Council accept the offer for the sale of the old works near the gas-works, having an area of 3652 yards, for £2500, in which price is included an overhead travelling crane, planing machine, &c. The larger scheme, he was careful to explain, was not then before the Council; but it was obvious that some scheme of extension would have to be carried out very shortly. They were told by the Manager that at the present time they were as near the maximum production of their works as they ought to be, consistent with the carrying-on of the undertaking in safety. The Gas Committee were unanimously of opinion that the time was nearly ripe for extension; and they hoped to be able to submit definite proposals in September, after Mr. Ford's return from British Columbia. For such purpose, there was only this one site available; and the Committee considered they were fortunate in getting the offer of it on the favourable terms named. The Committee's recommendation was carried unanimously.

KENDAL GAS AND WATER SUPPLY.

The Past Year's Working.

The working results of the Gas and Water Departments were referred to at some length at the recent quarterly meeting of the Kendal Town Council, over which the Mayor (Mr. W. H. Musgrove) presided.

In moving the adoption of the minutes of the Gas and Water Committee, Alderman Monkhouse, alluding to the report of the Gas Manager (Mr. W. R. Wilson), said that during the past year they had carbonized a larger quantity of coal than in any other year since they purchased the undertaking, and consequently they had made and sold a record amount of gas. In fact, the gas sold amounted to 85,595,100 cubic feet, against 82,261,400 feet the previous year. Mr. Wilson had been paying a good deal of attention to the question of unaccounted-for gas, and had brought it down to a more reasonable figure. The gross receipts for gas were £11,193, against £10,753; and residuals realized £4276, against £3892. The total receipts were £15,582, and the expenditure £11,341, leaving a gross profit of £4241, against £3667—showing a net increase of £574. This was very satisfactory. The number of consumers was 3750—1855 ordinary and 1895 prepayment. In 1896, the total was 1555. The unaccounted-for gas was 6·69 per cent., compared with 7·62 per cent. the year before. The cost of coal averaged 15s. 7d. per ton. They had now 1308 gas-cookers out, an increase of 163 during the year. The net result of the year's working was that, with gas at 2s. 6d. per 1000 cubic feet, Mr. Wilson had made the largest surplus since the works came into their hands. He had accomplished this under difficult circumstances. Seven years ago they closed their capital account. That was to say, whatever was required at the gas-works, structurally or otherwise, now came out of revenue; and he felt they owed a great deal to Mr. Wilson for the care he took on their behalf. He had managed to make the concern one of the best of its size in the United Kingdom. Last year they brought forward into the surplus account £461. This year they carried forward £1406. A sum of £400 was paid last year for the relief of the rates, and they paid off £764, the balance of the cost of the Burneside extension. This was paid out of surplus profits. In the ordinary way it would have had to be borrowed, and the interest and redemption met by yearly instalments. Then they had promised out of the balance £500 for the current rate, so that the amount carried forward to this year's account was £120. They must, however, face what was inevitable. They would probably have to meet a considerable increase in the cost of coal. They advertised for tenders, but encountered a 2s. 6d. per ton increase. Probably this might be slightly varied; but it would put Mr. Wilson greatly on his mettle to keep the commodity at the same price, and show a surplus next year. He thought they should run the gauntlet, and not raise their price. The sale of residuals was very satisfactory. They commanded a high price for coke, because they had a good article, through buying a good class of coal. The price of gas was now 2s. 6d. per 1000 cubic feet, compared with 3s. 6d. in 1896; and meter-rents and the rent of gas-cookers had been abolished. They had repaid loans and put into the sinking fund £15,046, and handed to the general district rate £8000. The Water Department was not so lucrative. The rental in 1896 was £2796, and last year £3809. They had a deficiency in 1896 of £460, and last year one of £104. This year they had passed a resolution to pay the deficiency out of the reserve fund. The Gas and Water Departments were large ratepayers, and, including one or two small rents, paid £700 a year to the urban district and the poor rates. In the carbonization department, their wages-sheet amounted to something like £1000, so that they were helping the town in this way, and also supplying at a reasonable price a commodity which was indispensable. So far as the number of customers for gas was concerned, the increase in the town was only 18, so that they were nearly at their maximum as far as Kendal was concerned. The supply to Oxenholme had been completed, and there were 49 new customers there. He hoped this would be as lucrative as the Burneside extension. They proposed to extend the mains from Bowston to Staveley; and as soon as the connections were made, carbonization at Staveley would cease, and gas would be supplied from Kendal, the same as Burneside.

Teignmouth Gas Undertaking.

The Gas Manager of the Teignmouth Urban District Council (Mr. J. A. Gray) presented his annual report at the regular meeting of the Urban District Council last Tuesday. It showed that the gross profit for the past financial year amounted to £1901 (12·07 per cent. on the capital indebtedness), and the net profit to £353. By order of the Council, a transfer of £268 had been made from the gas revenue to the district fund account, in connection with the public lighting improvement scheme; and £85 had increased the credit balance from £3352 at March 31, 1911, to £3438 at the corresponding date this year. The output of gas amounted to 46,113,190 cubic feet—an increase of 1,315,600 cubic feet compared with 1910-11. Private consumers used 31,371,900 cubic feet—an increase of 2·36 per cent.—and prepayment meter consumers 5,674,700 cubic feet, or 12·2 per cent. more. It was estimated that 5,797,200 cubic feet of gas were consumed by the public lamps. The unaccounted-for gas amounted to 2,103,690 cubic feet, or 4·56 per cent. of the total output—a reduction of 1·24 per cent. on the preceding year.

OLDBURY GAS UNDERTAKING.

The Results of the Past Year's Working.

At the Meeting of the Oldbury Urban District Council last Wednesday, the report and accounts of the gas undertaking for the past financial year, already noticed in the "JOURNAL" (*ante*, p. 55), were considered. In the particulars then given, it should have been stated that the sum of £1945 was transferred from the capital account to the profit and loss account.

Mr. C. THOMLINSON, the Chairman of the Gas Committee, in moving the adoption of the report, referred in detail to the accounts. He said the total income for the past year was £21,594, against £20,899 in 1910-11, or a net increase of £695. The gross profit was £4706, against £4056—an increase of £650; and the net profit £1116, against £465—an increase of £651. Compared with other years, he considered that last year, with all the troubles they had had owing to the coal strike, was the best since the Council had had the gas-works under their management; and great credit was due to the Manager (Mr. A. Cooke). As far as the coal strike was concerned, he did not think there was a gas undertaking in the kingdom in such a unique position as they were at Oldbury; and he thought Mr. Cooke was very fortunate in having in such a stock of coal that they were able to keep up the full supply of gas.

Mr. EVANS, in seconding the motion, said he thought, on the whole, the report was a most satisfactory one, and reflected the greatest possible credit on the management. He did not think any public body could have a better Manager than Mr. Cooke.

Mr. DAVIES agreed with the previous speakers that very great credit was due to the Gas Committee and the Manager. One pleasing feature of the accounts was that they had nearly £700 increase in the net profit, which clearly showed that there had been some energy displayed at the gas-works.

After some further remarks, the report and accounts were adopted.

WORKINGTON CORPORATION GAS UNDERTAKING.

Reports and Accounts for the Past Year.

The Gas Engineer and Manager of the Workington Corporation (Mr. E. George Hutchinson) has presented his third annual report, embracing the year ended the 31st of March last. He states that the improvements made in the carbonizing plant resulted in considerable saving; and the conditions of work have been improved for the stokers. The quantity of coal carbonized was 9532 tons, and the make of gas was 109,856,000 cubic feet, or 3·65 per cent. more than in 1910-11. The quantity sold through ordinary meters was 62,079,700 cubic feet, and through prepayment meters 29,260,700 cubic feet—together, 91,340,400 cubic feet. The gas accounted for was 102,879,000 cubic feet, or 93·48 per cent. of the make. The residuals produced per ton carbonized were: Coke and breeze, 13·5 cwt.; tar, 11 gallons; sulphate of ammonia, 24·22 lbs.

The report of the Borough Treasurer (Mr. John Noble) for the past financial year shows that the gross profit was £3626, against £3996 in the preceding year; being a decrease of £370. The net profit, after meeting interest, sinking-fund charges, and loan repayments, is £1905, compared with £1714 in the preceding year—an increase of £191. In accordance with the instructions of the Council, Mr. Noble transferred £650 to the old district fund. This left a profit of £1255 not appropriated. He explains that the small decrease in the gross profit is more than accounted for by the reduction in the price of gas and in the price charged for public lamps.

On the reports being presented to the Gas Committee, it was moved that the profit of £1265 should be placed to the credit of the gas undertaking. An amendment was, however, proposed to use £1000 in reduction of the rates and to put the balance in the gas-works reserve fund for the purpose of extensions. This was carried. It was also moved that the price of gas should be reduced by 3d. per 1000 cubic feet, and that discounts be abolished. An amendment was submitted making the reduction 1d. and abolishing discounts. The motion was, however, carried.

In moving the adoption of the minutes of the Gas Committee at the last meeting of the Town Council, Alderman Hall said they had consumed 20 tons less coal, made 3,876,000 cubic feet more gas, and sold 4,140,000 cubic feet more than in the preceding year, which was a very great record for the Gas Department. This was accounted for by knowing what coal to buy, by better retort work and practice, and by the fact that their plant was in exceedingly good order. Though they had used less coal, they had produced 350 tons more coke, which reflected credit on the management. These savings reduced to cash amounted to £352 10s., or £77 more than they paid their Gas Engineer as a year's salary. Improved methods of purification, adopted upon the suggestion of Mr. Hutchinson, had reduced the cost to £54 17s. from £204 6s. the previous year and £420 2s. 4d. in the financial year 1909-10. While officially moving the adoption of the minutes, he opposed the recommendation to reduce the price of gas by 3d., in face of a demand by the coalowners for 2s. 6d. per ton more for coal, which on 9600 tons meant £1200 more to pay. An amendment was moved to reduce the price by 1d. per 1000 cubic feet; and after some remarks, it was carried by 14 votes to 6. A motion to increase the charge for public lighting was defeated; and the minutes, as amended, were confirmed.

The Enfield Gas Company have recently fitted up a printing office in the town with an improved system of lighting which has given such satisfaction that the proprietors have called special attention to it in a letter sent by them to a local paper in support of their contention that it is unnecessary to go away from the district in order to get work done efficiently and at reasonable cost.

WEST BROMWICH GAS UNDERTAKING.

Increase in the Engineer's Salary.

At the Meeting of the West Bromwich Town Council last Wednesday, the Gas Committee submitted a report containing a recommendation that the salary of the Gas Engineer (Mr. Harold E. Copp) should be increased by £50 per annum. They stated that Mr. Copp was appointed in 1901, at a salary of £450 per annum, and that during the time he had been responsible for the management of the undertaking many improvements had been effected, and it had prospered greatly. Exclusive of the public lighting, the average price of gas had been reduced by more than 2d. per 1000 cubic feet.

The Chairman of the Committee (Mr. J. Brockhouse), in submitting the report, said the Committee were unanimously in favour of the proposed increase, believing it was quite justified by the extra duties that had been imposed upon Mr. Copp. It was a business transaction, and he believed the increase would bring in a tenfold reward. Mr. W. Lawley said he had seen four managers since he had been on the Gas Committee; and while he did not wish to make any invidious comparisons, he considered Mr. Copp was one of the most able men who had taken charge of the gas-works. He had never had to be reminded of his duty; and unlike the other officials, he had not asked for an increase in his salary for eleven years. Even with £500 a year, Mr. Copp would be the lowest-paid manager of any gas-works of a similar size over an area of many miles. Some members of the Council having spoken unfavourably of the proposed increase, and suggested that the price of gas should have first been reduced, Mr. Brockhouse, in reply, urged that in an undertaking such as theirs, with a capital of about £341,000, they should secure the best man possible. Mr. Copp had been very loyal to the Committee, and a good deal of the success of the gas undertaking was due to his management. If they asked a servant to do his best for them, they should not then "sweat" him. The recommendation was agreed to.

PUBLIC LIGHTING AT BOURNEMOUTH.

Gas Supersedes Electricity with Resulting Economy.

The subject of the public lighting of Bournemouth, which has been before the Lighting Committee of the Corporation for the past seven years, was discussed at some length at the monthly meeting of the Town Council last Tuesday, with a result which must be regarded as highly satisfactory from the point of view of the gas industry.

The Lighting Committee had had before them a statement, submitted by the Chairman (Alderman Slade) showing the cost of lighting by electricity and gas respectively. It is unnecessary to give details, but only the totals, which were: Electricity, £2803; gas, £2151—difference in favour of gas, £652. The Gas Company offered to supply three-burner inverted high-power low-pressure lamps of 600-candle power each; the lamps (of which 249 would be required) to be supplied, fixed, maintained, lighted, and extinguished by the Company for a period of five years, at an inclusive charge, with gas, of £5 per lamp per annum. The lamps, &c., would remain the property of the Company during and after the expiration of the term named. The Committee recommended that the change from electric to gas lighting should be made, and all necessary steps taken for carrying the resolution into effect.

The TOWN CLERK (Mr. Herbert Ashling) read a letter from the Secretary of the Bournemouth and Poole Electricity Supply Company, offering some remarks explanatory of their tender for the public lighting submitted on Oct. 23 last; also one from the Borough Surveyor (Mr. F. W. Lacey) with reference to the proposal to light the main streets by gas. He said his attention had been called to a system of electric lighting by means of centrally suspended metallic filament lamps which he thought would appeal to the Council and also to the Lighting Committee. At all events, he should like to consider the scheme before the Council definitely decided upon gas, especially as the latter would mean considerable upheaval of the surface of the roads. He added: "With regard to the gas, of course, you understand that the falling-off in the lighting in the first 400 to 600 hours is considerable, varying from 40 to 50 per cent.; whereas with metallic filament lamps it is not the case."

Alderman SLADE, in the course of a long statement, said that for the past three years the Lighting Committee had been making experiments with both gas and electric light, and they had every confidence in suggesting the adoption of the system they recommended. There were two reasons for this—the first on account of the increased lighting power they would get. At present, from the electric lights which were burning until midnight they had a total of 105,333 candle power in the area specified; but in the proposed scheme it would be 149,400 candles—an increase of 44,067 candles. In the lighting from midnight until dawn, there was a candle power of 11,520; but in the proposed scheme it would be 28,000 candles—an increase of 16,480 candles. This made a total increase of 60,547 candles, or equal to more than 50 per cent. The second reason for adopting the recommendation was that they would save money through the installation. The present system, burning till midnight, cost £2574, and under the proposed scheme it would cost £1245—a saving of £1329. From midnight until dawn the lighting now cost £229; but under the proposed scheme it would be only £210—a saving of £19. Thus, on the whole, the total saving was £1348. But loan charges would have to be paid through the installation of the electric lighting; and this was a sum of £696. So that, taking this away from the cost of the gas-lamps, a net balance was left of £652 per annum. The question had to be considered what was to be done with the money they would save if they agreed to the Committee's recommendation. They must admit that Bournemouth was insufficiently lighted, especially the older parts of the borough; but if the scheme suggested were adopted, the result would be that they would be able to make Bournemouth, instead of one of the worst-lighted towns in the country, one of the best, if not the very best. Having

criticized the letter received from the Secretary of the Electricity Company, Alderman Slade, said the statement in the letter of the Borough Surveyor as to the falling-off in the lighting power of the gas in the first 400 to 600 hours from 40 to 50 per cent. was absolutely untrue. He did not want any expert advice about it, because they had the thing before them. Gas-lamps which had been put up about three years ago had been tested, and there was not 2 per cent. falling-off in illuminating power after they had been fixed. The Borough Surveyor's statement was misleading; and he was entirely wrong to make it, because it could be proved differently. They had the gas-lamps, and these had given every possible satisfaction; and it was because the Committee were so satisfied with this kind of light that they were confident in recommending gas instead of electricity.

Mr. Fox said he was not an engineer, but he was prepared to say that the lamps did depreciate. It would be unwise to take a retrograde step and return to gas lighting; so he would ask Alderman Slade to let the matter be referred back to the Committee, where they could have further argument about the scheme. He moved an amendment to this effect.

After some discussion, the amendment was put, and was lost by a majority of two. The Committee's recommendation was then carried.

SALFORD GAS-COAL CONTRACTS.

Advantage Claimed for Contracting Privately.

By contracting privately for coal and cannel, the Gas Committee of the Salford Corporation claim that they have saved a considerable sum on purchases to date for the current year. This being in contravention of the Standing Orders, Alderman Phillips, at last Wednesday's meeting of the Town Council, moved the suspension of the particular order which makes advertising compulsory, so that certain contracts for coal and cannel might be confirmed. He said that in past years there had been some objection in regard to the way in which the Gas Committee had bought their coal without advertising for tenders. This year advertisements had not been put in the papers, because the present state of the coal market would not, in the opinion of the Committee, lead to the best business. Colliery owners and representatives had met the Committee, and the business had been done by that body as a whole. The result had been exceptionally successful, and much to the pecuniary advantage of the Corporation.

The proposal was opposed by several members of the Council; and an amendment was moved to the effect that the whole matter be referred back to the Committee with an instruction that the Standing Order should be enforced. It was the contention of Alderman Jackson, who led for the opposition, that if the Committee were allowed to do this sort of thing, all other Committees of the Corporation should have a similar privilege. Further, he did not accept the statement of Alderman Phillips that the Committee had saved money by private dealing; and he was not prepared to give the Committee a free hand when other Committees had to observe the order.

Alderman Snape said he could assure the Council that a considerable sum had been saved on the provisional contracts entered into for the supply of coal and cannel. He warned members of the Council that if they insisted on the Standing Order being complied with, the ratepayers would have to pay some thousands of pounds more for coal than they would have to do under the arrangements made by the Gas Committee.

On being put to the vote, the amendment was lost—15 voting for and 29 against it. Therefore the Standing Order was suspended; and the following contracts were confirmed: Cannel—Earl of Bradford, Great Lever, 25,000 tons of screened; Mr. F. E. Moss, Tyldesley, 4000 tons of best screened; Messrs. J. Roscoe and Sons, 5000 tons of screened Arley; Mr. J. E. Cowcill, 10,000 tons of best Wharncliffe silkstone. Coal—Messrs. J. Roscoe and Sons, 40,000 tons of screened Arley.

REDUCTIONS IN PRICE AT SMETHWICK.

The Gas Committee of the Smethwick Corporation recommended at a recent meeting of the Town Council the following alterations in the price of gas: In the case of prepayment consumers, the quantity of gas to be increased from 28 to 30 cubic feet for 1d., equal to a reduction of 2·38d. per 1000 cubic feet; and ordinary consumers for lighting purposes, a reduction of 2d. per 1000 cubic feet to all classes. The charges for gas used for power and manufacturing purposes to be as follows: Consumers taking less than 2 million cubic feet per quarter, a reduction of 1d. per 1000 cubic feet; those taking 2 and less than 3 millions, a reduction of 2d.; consumers of more than 3 million cubic feet per quarter, a reduction of 3d. It is estimated that these reductions will amount to a total of £3900 on the year's output of gas. The recommendations gave rise to a rather long discussion.

Alderman Adams asked if the Committee could not include in the concessions the special facilities which the Chairman had partially promised for users of gas for cooking and heating. Mr. Collins said that while he was pleased to see the reductions to ordinary and prepayment consumers, he was not delighted with the gift of £1000 to the users of gas for motive power. He asserted that gas was being supplied for this purpose at less than cost price; and he thought the Committee ought to have made a reduction of a clear 3d. to the slot-meter consumers. Mr. Ryder said he could fully understand the position of the Chairman of the Committee (Alderman Pinkney), who was fighting a big battle against electricity; and he could quite appreciate his anxiety to get hold of the large consumers.

Replying to the criticism, Alderman Pinkney said before the Committee could grant the concessions desired to consumers of gas for cooking and heating purposes, they would have to spend at least £3000; and it would necessitate the putting-in of two meters at every house. He believed when the coal market had settled down the Committee

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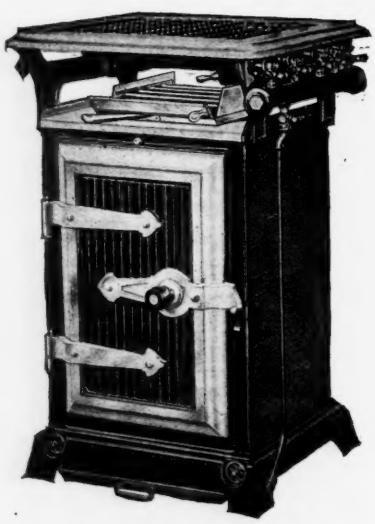

have been served with the minimum of trouble and the maximum of satisfaction to the writer of the following testimonial as the result of using a Davis Cooker. It pays you well to have satisfied consumers like this on your books?

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would, by reason of economies at the works, be able to produce gas at such a price that people would be almost compelled to use it, and so make their day load. He asked his colleagues not to believe that they were selling gas at a loss. The only thing they were doing at a loss was the maintenance of incandescent burners, on which they did lose nearly £50 a year; but, after all, they regarded this as being a good investment.

The recommendations were approved.

GAS v. ELECTRICITY AT PRESTON.

Town Council and Street Lighting Experiments.

The Streets and Lighting Committee of the Preston Town Council have for some time had under consideration the question of the better lighting of the principal thoroughfares in the town. At a recent meeting, the members of the Committee had before them a report by Mr. J. F. Simpson, the Electric Lighting Engineer, and another by Mr. T. Cookson, the Borough Engineer and Surveyor, with regard to gas. It was then decided to postpone the consideration of these reports, and to recommend the Council, as an experiment, to have Stanley Street lighted by metallic filament lamps at a cost not exceeding £70.

When the proceedings of the Committee came up for confirmation at the last meeting of the Council, several members suggested that the recommendation had been arrived at without adequate thought; and an amendment was submitted that it be referred back for further consideration. It was also suggested that the proposed experiment should take place in some other less important and less efficiently lighted area than the street named. Mr. Houghton, supporting the action of the Committee, stated that the matter had been fully and adequately considered, and Stanley Street was selected after long and continued discussion. The experiment would cost only £70, and it would settle one way or another the new kind of lighting proposed by Mr. Simpson. Mr. Oakey considered that the Council ought not to try an experiment with the electric light unless they had a trial with gas. He said he did not hold a brief for either electricity or gas, but only considered the interests of the ratepayers. Mr. White, in defending the action of the Committee, said it was necessary that they should have experiments, so that they might the better understand the reports which had been submitted to them on the different methods of lighting. After the Committee had read the reports, they were not much nearer; and the members thought the best way to deal with the matter was by making an actual experiment in the streets. In his response, Mr. Hodgson, the Chairman of the Streets and Lighting Committee, said he had refrained from going into the matter in open Council because he wanted to avoid a discussion; the two parties interested—the Gas Company and the Electric Light Company—being large ratepayers.

On being put to the vote, the amendment was declared lost; and the recommendation of the Committee was therefore approved.

INCANDESCENT GAS-FITTINGS IN SCHOOLS.

London County Council and Maintenance.

The Education Committee of the London County Council presented, at the meeting of the Council last Tuesday, the following report on the maintenance of gas-fittings in schools; and it was adopted.

The Council, on Nov. 26, 1907, decided that at non-provided schools where incandescent lighting had been installed, the burners, globes, mantles, and forks should be renewed by the Council, as and when occasion required, during the winter months; that during the remainder of the year, and during the Christmas vacation, such renewals should be undertaken by the Managers without cost to the Council; and that the cost of the renewal of incandescent gas-burners should be borne by the Council at schools exclusively occupied by the Council, and jointly by the Council and the Managers at schools which are used by the Managers as well as by the Council. We are advised that in the case of a number of non-provided schools the maintenance of the incandescent gas-fittings during the summer months, for which the Managers are responsible, is not efficiently carried out, and that, when the gas lighting is required for the Council's classes during the winter months, it frequently happens that the incandescent fittings are in a state of bad repair and neglect, particularly when the interior of the school has been painted or cleaned during the holidays. In such cases, it has been the practice to inform the Managers that, in accordance with the resolution referred to above, they are responsible for the maintenance of incandescent gas-fittings during the summer, and they are asked to ensure that the requirements are observed in future.

We are of opinion, however, that a better arrangement would be for the Council to take over the whole of the work of maintaining gas-fittings, and to apportion the expenses between the Council and the Managers. This course is followed in the case of the supply of fuel, the cost of gas, &c., and the proportion of the accounts to be paid by the Managers is calculated upon the number of occasions on which they occupy the school premises. If a similar arrangement is applied to the maintenance of gas-fittings, it will secure that the fittings are kept in a clean condition. In view of the fact that the Managers will contribute a portion of the cost of maintenance during the whole year, it is not anticipated that the Council will have to bear any additional expenditure. We recommend—"That, as from Sept. 30, 1912, the resolution of Nov. 26, 1907, with reference to the maintenance of incandescent fittings in non-provided schools, be not further acted upon. That, as from Oct. 1, 1912, and until further order, the burners, globes, mantles, and forks at non-provided schools where incandescent lights have been installed be renewed by the Council, as and when occasion requires, throughout the year; and that the cost of maintenance of incandescent gas-fittings be borne entirely by the Council at schools exclusively occupied by the Council, and jointly by the Council and the Managers at schools which are used by the Managers as well as by the Council, on the basis of their respective user."

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SALES OF STOCKS AND SHARES.

The principal features of the sale conducted by Messrs. A. & W. Richards at the Mart, Tokenhouse Yard, E.C., last Tuesday, were three issues of new capital by order of Directors. The first lots consisted of new ordinary £10 shares in the Ascot District Gas and Electricity Company, ranking for a maximum dividend of 7 per cent., but carrying 5½ per cent. as from the 15th inst. They were sold at £10 10s. each. Some £10 "C" shares in the East Grinstead Gas and Water Company, ranking for a maximum dividend of 7 per cent., but carrying £6 13s. per cent. from the 31st inst., were next offered; and they realized £11 10s. to £12 apiece. Next came some 4 per cent. perpetual debenture stock of the same Company, which was all sold at £94 to £95 per £100. The other new issue consisted of £3000 of 4½ per cent. perpetual debenture stock of the Annfield Plain and District Gas Company, which was all placed at £90 per £100. At the same sale, a few fully-paid additional ordinary £10 shares in the North Middlesex Gas Company, ranking for a standard dividend of 7 per cent., subject to the sliding-scale, and now carrying £7 7s. per cent., were disposed of, by order of executors, for £15 10s. each; the purchaser taking the dividend accruing from the 1st of January of the present year, which at the rate last paid amounts to 7s. 4½d. per share. Some £5 additional 7 per cent. shares in the Harwich Gas Company, sold under similar instructions, fetched £6 15s. each.

A large number of gas and water shares were offered for sale by public auction at the Knowsley Hotel, Bury (Lancs.), last Thursday. The following transactions were recorded: 28 new ordinary £10 shares in the Radcliffe and Pilkington Gas Company sold for £15 15s. per share; a £22 19s. 4d. "A" redeemable annuity of the Accrington and District Gas and Water Board, 28 years' purchase; 30 original £10 shares in the Fleetwood Gas Company, £19 per share; 15 "B" shares, of £10 each, in the same Company, £17 per share; 22 perpetual annuities of 14s. each of the Warrington Corporation, under the Gas Act of 1877, 27½ years' purchase; £328 of £5 per cent. maximum ordinary stock of the Hartlepool Gas and Water Company, £122 10s. per cent.; £150 ordinary stock of the Newcastle and Gateshead Water Company, £123 per cent.; £50 of consolidated 5 per cent. preference stock of the same Company, £133 per cent.; £30 of 5 per cent. preference stock of the same Company, £131 per cent.; £109 of 5 per cent. debenture stock of the Southport Water Company, £128 per cent.; £167 of "A" stock of the Fylde Water Board, £73 per cent.; ordinary "B" shares (£10) in the Cleveland Water Company, £17 5s. and £17 10s. per share; a £35 10s. perpetual annuity of the Bury and District Joint Water Board, 28 years' purchase.

It was reported to a meeting of the Rochdale Corporation Gas Committee last Wednesday that a test of the new Glover-West vertical retorts had been made, and that the result was satisfactory.

WATER FOR FIRE EXTINCTION IN LONDON.

Provision of Additional Mains.

At the Meeting of the London County Council last Tuesday—Major-General Lord CHEYLESMORE, K.C.V.O., the Chairman, presiding—a discussion took place on a report presented by the Fire Brigade Committee on the 14th of May last, on the subject of improving the existing arrangements for the supply of water for the extinction of fire in the Metropolis.

The report set forth that the Committee had from time to time drawn the attention of the Council to localities in which the supply of water is inadequate for fire purposes, and on Feb. 25, 1908, they reported that they had been in communication with the Metropolitan Water Board with a view to the Board laying down larger mains in certain districts, so as to ensure a proper supply of water being available. A conference on the subject took place, at the request of the Board, on Feb. 28, 1905; and subsequently a list was sent to the Board of certain important cases of extensions, connections, or improvements of mains which ought to be undertaken. The Board estimated the cost of the work at £6597; and of this they said they were prepared to pay £800. Before any decision was arrived at, a letter was received from the Board suggesting that a further conference should be held on the whole question; and it took place on July 18, 1907. Towards the close of the year, the Board asked the Council to join in submitting to arbitration the question of the allocation of the cost of the suggested works, and expressed their willingness to put them in hand forthwith, subject to the Council consenting to the arbitration. This consent was given; and Mr. Alexander Glen, K.C., was appointed by the Local Government Board to deal with the matter. Evidence was heard by him early in January last, and he published an interim award, in which he decided that the works required exclusively for the extinction of fire should be paid for by the Council, and that those needed for ensuring an adequate supply of water for other purposes should be carried out at the cost of the Board. He added that, except as he had stated, the cost of each of the works ought to be apportioned between the Council and the Board having regard to "the nature and magnitude of the fire risks for which the Council desired the work to be constructed, or of any other existing or probable fire risks for which such work will be available, and the use which has been, is, or may reasonably be expected to be, made of the work for the supply of water by the Board for purposes other than that of extinguishing fires." In view of the terms of the award, it was suggested that, with the view of saving the unnecessary expense and the time involved in the further hearing of the arbitration, representatives of the Council and the Board should meet, and endeavour to come to some arrangement on the basis indicated by the Arbitrator. This proposal having been agreed to by the Board and by the Committee, negotiations are about to be entered into. Apart, however, from the question of the arbitration and the award

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thereunder, the Committee carefully considered the whole question of the supply in London of water for fire extinction; and they came to the conclusion that the present state of the law is unsatisfactory, and that the Board should be under the obligation to provide mains large enough to afford a sufficient supply of water for use at fires as well as for other purposes. They therefore considered that the Council should seek legislation to this end; and they recommended that this should be done next session—provision being made for the supply of water "free of cost to the Council."

Mr. J. B. P. KARSLAKE, the Chairman of the Committee, asked leave to take back the report. He mentioned that a communication had been addressed to the Council by the Water Board, suggesting a conference; and he thought that if the matter was withdrawn from discussion for the time being, it might aid to a settlement of the question at issue.

Mr. STUART SANKEY, who had upon the *agenda* a notice of an amendment to the effect that the recommendation should be referred back to the Committee in order that, after consultation with the Parliamentary Committee, they might negotiate with the Water Board, said he hoped, having regard to the willingness of the Chairman of the Committee to take the report back, to prove the advisability of this being done. He thought it would be very unfortunate if the two bodies concerned were to fight each other before a Committee of Parliament, as recommended by the Committee. They knew the obligation was upon the Board to supply water for extinguishing fires, but not to provide large mains with adequate pressure of water for the purpose. All they had to do was to supply sufficient mains for furnishing water for the domestic supply; and this they did. He was sure, if the Council and the Board met in conference, they would be able to come to some decision which would avoid expensive proceedings before a Parliamentary Committee. For this reason he thought the Council would agree that, before they passed any resolution such as that submitted by the Committee, they should have an opportunity of meeting the Board, and endeavouring to come to some solution which would not only be practicable, but would suit London as a whole. He therefore asked the Council to give the Committee an opportunity of holding the conference, and expressed the hope that the meeting would take place. He concluded by moving his amendment.

Mr. E. G. EASTON, in seconding the amendment, remarked that at present the Board supplied the water, but the pressure was lacking. Who was going to the expense of providing for high pressure in the mains when the Board did not require it for domestic purposes? The question naturally arose as to how the expenditure should be met and which body should pay. He thought two or three proposals were laid down which commended themselves strongly to the Engineers of the Council and the Board; and if the matter was referred back, nothing but good would come of it.

Mr. J. D. GILBERT hoped the matter would not be referred back without the Council passing the recommendation on the *agenda*. It was unanimously agreed to by the Committee; and he did not know what Mr. Sankey's object was in suggesting a conference. He (Mr. Gilbert), however, had no objection, if the recommendation was passed, to meeting the Board. It was true they had had a communication from the Board to the effect that the Chairman of the Board would use his good offices in promoting the conference if it was desired. But he (the speaker) did not think the Council, having regard to the amount of money which London paid to the Board, ought to be in this position. He wanted London to insist on its rights. He considered they were entitled to a free and efficient supply of water for fire-extinguishing purposes; and he wanted the Council to say so. Over and over again, when the Brigade had been called to a fire, all the water they could get in the streets of small houses had been the ordinary domestic supply, which was utterly useless. If the Board had the monopoly of supplying London with water, the Council ought to insist that for fire-extinguishing purposes they should have sufficient water free.

Mr. L. W. S. ROSTRON said he was not greatly concerned with the question whether the Council had the water free of cost; but he thought they should get the pipes put down without delay. As regards payment, this was a matter that could be settled between themselves.

Mr. J. SHIRLEY HOLMES suggested that, instead of referring the recommendation back, it should be passed with the addendum, "unless in the meantime, as the result of a conference between this Council and the Water Board, a satisfactory arrangement shall have been arrived at." This would, he said, allow several months in which to come to an arrangement with the Board, who would know that the Council would take action unless an agreement was arrived at.

Mr. KARSLAKE said he thought Mr. Holmes' suggestion would meet the case.

Mr. HOLMES asked Mr. Karslake if he was prepared to accept the suggested addendum; but he did not receive any reply.

Mr. SANKEY said he could not accept it.

The amendment was then put, and it was carried by 41 votes to 30.

Testing Street-Lamps in Paddington.—At the meeting of the London County Council last Tuesday, it was resolved, on the recommendation of the Public Control Committee—"That, in connection with the lighting of the Metropolitan Borough of Paddington by the Gaslight and Coke Company, arrangements be made for the candle power of the street-lamps to be tested for the Paddington Metropolitan Borough Council, when required, by the Chemical and Gas Department, upon the conditions that representatives of neither the Borough Council nor the Company shall be allowed to witness the tests unless both parties shall have been invited to be present; that the Borough Council shall reimburse to the Council any expenditure which may be necessary in providing apparatus for the tests; that the Borough Council shall pay a fee of £3 3s. in respect of each occasion on which tests are made; and that the arrangement shall be terminable by one month's notice on either side."

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COALITE, LIMITED.

An Ordinary General Meeting of Coalite, Limited, was held last Thursday, at Winchester House, E.C.—Mr. A. M. H. WALROND, the Chairman, presiding.

The SECRETARY (Mr. H. J. Almond) having read the notice convening the meeting,

The CHAIRMAN said that out of an issue of shares made during the year they had lent the British Coalite Company a sum which, including interest to the end of 1911, amounted to £7082. Unless they themselves were prepared to raise the money to prove the process (which would be a costly proceeding), the wisest thing to do was to render the British Company all the help they possibly could. Their success, and their ability to deal with their foreign patents, rested on the British Company—or, rather, now the Eticoal Syndicate—proving that the process can be made to work at a commercial profit. There were now 111,894 ordinary shares in the British Company standing in their books at £54,099. This was no doubt at present a considerably higher figure than their market price. It was hoped, however, that the day was not far distant when these shares might be of better value. The Company was now being run at a minimum of expense. The total cost of the year's working was £2804. He then continued as follows: "This sum has to be added on to the old balance, making the balance at present £16,077 to be carried forward. As I remarked last year, I cannot ask you to consider this satisfactory. I think the Board have shown that, at any rate, they are cutting down all unnecessary expense. I said last year we were making every effort to pay all our creditors. We have done a good deal in this way, and I repeat that we shall not be content until these debts have all been paid. Under all the circumstances, we have been unable to take any active steps to dispose of our foreign patents. It would be a great mistake to attempt to do so until we know for a certainty what can be done with the process commercially. I told you last year that Mr. Clarke—whom I am sure you are all glad to welcome as having joined our Board—had demonstrated to us that, under proper management, the coalite process was one of considerable value. He did so then as the result of numerous experiments made with small batteries. These experiments have now matured, and there is working at Barking, under the management of the Eticoal Syndicate, a battery which is carbonizing 35 tons of coal a day. This battery has only been in commission about a fortnight; so it is early days yet to say much about it. I will say this, however—but I do not want you to take it for more than it is worth—that, as far as it goes, Mr. Clarke is thoroughly satisfied with the way the battery is shaping; and as soon as it is properly tuned-up, Sir William B. Peat, whom, I am sure, with me, you will all congratulate on his recent honours, will have the battery carefully watched and checked in every way for a period of three months, and will issue a report for good or evil on its working, As soon as his report is obtained, a copy shall be sent to each shareholder. I would like here to explain the reason this meeting was not held in March, as it should have been. In the spring, we had hoped by delaying the meeting we might have had the results for the three months' working; and I thought it was worth while postponing the meeting to enable me to give you these results. Owing, however, to the labour unrest, everything was delayed, and no continuous supply of coal could be assured. Mr. Clarke very wisely declined to commence work until he was reasonably certain of being able to go right ahead without any stoppages; and it is only a fortnight ago that he was in this position. I wanted to make the reason for the delay in the meeting quite clear to all of you. I told you last year our process was developing on the lines of the well-known coke-oven processes, and this I repeat; and if Sir William Peat's report is such as I believe it will be, I think we shall be able to show the process is superior to any coke-oven process now existing, and producing a good household fuel which is smokeless. I also again repeat that we all of us on this side of the table still believe in the coalite process. I ask you again to exercise patience, notwithstanding the disappointments of the past. At any rate, if it is your wish that we should do so, we intend to stick to the ship, and hope one day to come to a safe anchorage."

The report and accounts were unanimously adopted, and Mr. Walrond was re-elected a Director.

The CHAIRMAN returned thanks, and proposed that the election of Mr. Herman Clarke as a Director be confirmed. Mr. Clarke was, he said, really the motive force behind the coalite process at the present moment. He was the man who had pulled the British Coalite Company out of the mud, and was now Managing-Director of the Eticoal Syndicate; and it was very desirable that they should have him in close touch with all the work of the concern on their own Board.

This was agreed to.

Income-Tax on Water Profits.—At a conference of representatives of Rural District Councils recently held in London, Mr. G. Beaumont, of Wakefield, called attention to the principle involved in the case of *Wakefield Rural District Council v. J. W. Hall, Surveyor of Taxes*, relating to the payment of income-tax on profits made by a rural district council out of their water undertaking. The case, he thought, affected all councils with the exception of those who had no water supply, but depended on wells, and those who were served by a water board. He summarized briefly the facts of the case. The Wakefield Rural Council supplied water to various parishes within their area, in certain of which a profit was made and in others there was a loss. The Council had deducted the losses from the profits made in other parishes, and paid income-tax upon the balance. This practice had been in force for twenty years up to 1909, when the action was taken. The local Commissioners of Taxes upheld the contention of the Surveyor; but on appeal the Courts allowed it, with costs. The case was to be carried still further; and he estimated the costs of the action at £1000.

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NOTES FROM SCOTLAND.

From Our Own Correspondents.

Saturday.

Edinburgh.

The session of the Eastern District of the Scottish Junior Gas Association was brought to a close in Edinburgh on Saturday. From the reports submitted, it was apparent that the Association is making good headway, and that, so far as the purely educative side of the proceedings are concerned, not only is full advantage taken of it, but it is of great benefit to the members themselves. The experiment of a summer session has been tried; but the old arrangement is to be reverted to. It is to be hoped that the change will realize expectations in an increased membership, and in a larger average attendance at the meetings.

The statement of accounts for the year ending Whitsunday, 1912, of the Edinburgh and District Water Trust shows that the estimated receipts for the year from all sources was £176,719, while the actual receipts were £179,380; being upwards of £2600 over the estimate. The estimated ordinary expenditure for the year was £176,427. The actual expenditure was £179,239, or upwards of £2800 over the estimate. The property account expenditure was £9144; and the mortgage debt of the Trust was reduced during the year by the redemption of mortgage loans of £37,590.

Aberdeen.—The Gas Committee of the Town Council met on Wednesday. The Committee considered the offers for the supply of coal, oil, and lime for the ensuing year; and it was agreed to contract for oil and coal equivalent to 76,500 tons of coal at a cost of £61,390, on an average of 16s. per ton, which is 1s. 6d. per ton in excess of last year's price.

Ellon.—A meeting of the Town Council was held on Thursday—Provost Pirie presiding. A copy of the abstract of the burgh accounts was submitted, including the gas undertaking. Mr. R. Gordon, the Burgh Treasurer, said that three years ago there was a deficiency of £65 on the gas-works. Two years ago it was reduced to £45, and last year this deficit was entirely wiped out. On the past year's working, there was a favourable balance of £35. He pointed out, however, that the oil from which the gas is produced would cost £17 more this year than the previous year.

Fraserburgh.—A meeting of the Town Council was held on Friday—Provost Finlayson presiding. On the recommendation of the Gas Committee, it was agreed to grant an increase in wages of 1s. per week to the leading stokers and yardmen at the gas-works. The Committee also recommended that the price of gas for the current year be fixed at 4s. 2d. per 1000 cubic feet. Mr. Will, the Convener of the Gas Committee, said that, notwithstanding a considerable increase in the price of coal, it was proposed that there be no increase in the price of gas. The annual statement of accounts, prepared by Mr. H. G. Ritchie, the Gas Manager, was submitted, and showed that the gross profits were £2200. After paying interest on the instalment of loan, there was a net profit of £634, of which sum £396 was written-off for depreciation, and the balance of £238 carried forward. The sum expended on coal was £2290; and the estimated cost of a similar quantity for the current year was £2603—an increase of £313. The quantity of coal used last year was 2807 tons, and the make of gas was 28,366,800 cubic feet. The rates fixed for gas were 4s. 2d. per 1000 cubic feet for ordinary purposes, and 3s. 9d. for gas-engines, with 2½ per cent. deduction for gas consumed at the ordinary rate if the account is over £50 and under £100, and 5 per cent. if the year's account is over £100.

Galashiels.—The report of the Directors of the Galashiels Gaslight Company submitted to the annual general meeting held on Tuesday shows that the profit for the year was, omitting shillings and pence, £2285, and that the reserve at June, 1911, was £8334—a total of £10,620. The following appropriation is recommended: Dividend at 10 per cent., free of income-tax, £2100; and to reserve, June, 1912, £8520—total, £10,620. The quantity of gas manufactured during the year was 79,266,000 cubic feet. The loss by leakage was 3,793,962 cubic feet, and the quantity used on the works and offices 792,660 cubic feet—a total of 4,586,622 cubic feet. In consequence of the considerable rise in the price of coal, it was found necessary to fix the price of gas for the ensuing year at the rate of 2s. 8d. per 1000 cubic feet; being an increase of 2d. per 1000 cubic feet, as compared with last year. The amount spent on coal was £5257.

Haddington.—During the week workmen have been busily engaged in laying a new gas-main on the south side of Market Street, from near the Townhouse down to the main put in a few years ago in Brown Street. The new pipe is a 3-inch one.

Leslie.—The annual meeting of the Leslie Gas Company was held on Tuesday. The balance-sheet submitted showed a profit of £439, from which it was proposed to put £100 to the reserve fund, carrying forward an extra £100 with a view to paying off a couple of £50 debentures, while they recommended the usual 7½ per cent. dividend, and also the addition of a 2½ per cent. bonus to the shareholders. The Chairman informed the meeting that cookers were now given free. It was expected that the price of gas would be reduced from 4s. 2d. to 3s. 9d. per 1000 cubic feet, and more discount allowed to large consumers. The report and balance-sheet were adopted after a brief discussion.

Wishaw.—Owing to the increase in the price of coal, there is not likely to be a reduction in the price of gas in Wishaw this year. The consumption of gas for the year ending May 15, 1912, shows an increase of about half-a-million cubic feet. This is believed to be due to better conditions of employment and to the growing use of cooking appliances, &c. The number of consumers is 4606—a slight falling off compared with the previous year.

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CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *July 6.*

Sulphate of Ammonia.

During the past week, the fall in prices has not been so rapid as it was in June, but the tendency has still been towards a lower level. There has been rather more demand from consumers abroad; but the current output has proved ample to fill all requirements, and at the close values have receded to £14 3s. 9d. to £14 5s. per ton f.o.b. Hull, £14 5s. to £14 6s. 3d. per ton f.o.b. Liverpool, and £14 6s. 3d. to £14 7s. 6d. per ton f.o.b. Leith. For future delivery, producers continue to quote £14 10s. to £14 12s. 6d. per ton f.o.b. principal ports, according to the period of shipment, but it has not been recorded that they have found buyers at these figures. It is again reported from abroad, however, that middlemen are selling at 2s. 6d. to 5s. per ton reduction.

Nitrate of Soda.

There is no new feature to comment upon in the market for this material, and the quotations remain 11s. and 11s. 1½d. per cwt. for ordinary and refined quality respectively on spot.

LONDON, *July 8.*

Tar Products.

The markets for tar products continue firm. Pitch remains in about the same position. Manufacturers are still holding out for to-day's prices; but business is difficult to negotiate. Ninety per cent. benzol is firm, and there is a fair amount of inquiry in the market for near and forward. Solvent naphtha maintains its price; and there are inquiries in the market for delivery into next year. Creosote is firm, and there are several good inquiries for the article. Crude carbolic acid is without alteration.

The average values during the week were: Tar, 28s. to 32s. *ex* works. Pitch, London, 53s. to 53s. 6d.; east coast, 52s. 6d. to 53s.; west coast, Clyde 53s. to 54s. 6d., Manchester 51s to 52s., Liverpool 52s. to 52s. 6d. Benzol, 90 per cent., naked, London, 11½d. to 1s.; North, 11½d. to 11½d.; 50-90 per cent., naked, London, 10d.; North, 9½d. Toluol, naked, London, 10½d. to 11d.; North, 10d. Crude naphtha, in bulk, London, 5d. to 5½d.; North, 4½d. to 5d. Solvent naphtha, naked, London, 1s. 1½d. to 1s. 2d. f.o.b.; North, 1s. to 1s. 0½d. f.o.b. Heavy naphtha, naked, London, 11d. to 1s. f.o.b.; North, 10d. to 10½d. f.o.b. Creosote, in bulk, London, 3d. to 3⅛d.; North, salty, 2⅞d. to 2¾d.; liquid, 2⅞d. to 3d. Heavy oils, in bulk, 3¼d. to 3⅜d. Carbolic acid, casks included, 60 per cent., east and west coast, 2s. 6d. to 2s. 7d. Naphthalene, £4 10s. to £10; salts, 45s. to 50s., bags included. Anthracene, "A" quality, 1½d. to 1¾d. per unit, packages included and delivered.

Sulphate of Ammonia.

There was a decided drop in price during the past week for the prompt position, which to a certain extent is affecting the forward, though the majority of manufacturers will not reduce their prices for delivery beyond August. Actual Beckton to-day is equal to about £14; outside London makes, £13 7s. 6d. to £13 10s.; Hull, £14 5s. to £14 6s. 3d.; Leith, £14 6s. 3d. to £14 7s. 6d.; Liverpool, £14 6s. 3d.; Middlesbrough, £14 5s.

COAL TRADE REPORTS.

Northern Coal Trade.

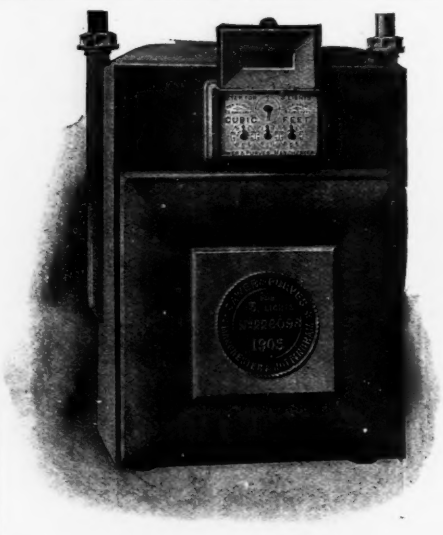
There is now more activity in the coal trade of the North, and the shipments are nearly normal again. In the steam coal trade, best Northumbrians are steady at 13s. to 13s. 4½d. per ton f.o.b.; second-class steams are 11s. to 11s. 3d.; and steam smalls are in fair demand at 7s. 9d. to 8s. 6d. There is now a full output at the collieries, and the production is taken up, except when the steamers are delayed. In the gas coal trade, there is a better demand setting in, now that consumers show more inclination to stock freely. Best Durham gas coals are from 13s. 3d. per ton f.o.b.; and second qualities are from 11s. to 11s. 6d. per ton. For "Wear specials," the current f.o.b. price is 14s. per ton. Contracts are being placed for the South Shields gas coal supply—some 40,000 tons; but the prices have not transpired. A sale has been made for export of about 30,000 tons for delivery over the year, at a price equal to 11s. 6d. to 11s. 7d. per ton f.o.b. for good second-class coal. It is expected that some heavier contracts will soon be in course of negotiation. Coke is firmer. Gas coke does not show much change—good brands being from 17s. 9d. to 18s. per ton f.o.b. in the Tyne.

Scotch Coal Trade.

There has been a good demand for all classes of coal during the week, and the market is in a healthy condition. Prices are firm, and there has been an appreciation in several instances. On Friday, on the Glasgow Exchange, the f.o.b. prices quoted were: Steam coal, 11s. to 11s. 6d. per ton; splint, 12s. to 12s. 6d.; ell, 11s. 6d. to 11s. 9d.; trebles, 12s. 3d. to 12s. 6d.; doubles, 11s. 9d. to 12s.; singles, 11s. 6d. to 12s.

New Water Scheme for Ruthin.—The Ruthin Rural District Council's scheme for supplying water to most of the parishes on the north-eastern side of the Vale of Clwyd has been formally inaugurated by Mrs. Humphreys Roberts, wife of the Clerk to the Council. The scheme has involved a very heavy expenditure; but it is certain to prove of advantage to the locality.

DRY GAS METERS.



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Middleton Corporation's Non-Paying Electricity Undertaking.—At the monthly meeting of the Middleton Town Council last Wednesday, Mr. W. M. Wiggins, in moving the adoption of the minutes of the Electricity Committee, said it would be seen from the balance-sheet there was again a loss on the working of the electricity undertaking. For the past financial year, the deficit was £941, after allowing £500 for depreciation. It was the opinion of Mr. Wiggins that until they could sell more current and get their coal cheaper, they would not be able to make a profit on the undertaking.

Patent Wall Hooks.—Damage to the plaster and bricks of walls by nails is such a common experience, and the annoyance so great, that there ought to be a general welcome given to a hook that can be driven into a wall, and a clean job made of it. Messrs. Rasmussen, Webb, and Co., of 11, Charterhouse Buildings, E.C., call attention to such a hook. The portion that is driven into the wall is tubular; and the end that first enters is edged so that a clean-cut core is the result. The shank of the hook is strong, so that it can be easily made to penetrate a brick without difficulty by giving it a smart blow or two with a hammer.

Cheltenham Electricity Undertaking.—Mr. Merrett, referring in the Cheltenham Town Council to the Provisional Order granted by the Board of Trade for the extension of the electric light to the adjacent parishes of Prestbury and Leckhampton, said it was perhaps not a matter for surprise that the Gas Company had decided to carry their opposition to the Committee-room of the House of Commons, but what was a matter for surprise was that the Ratepayers' Association were supporting them in their opposition. The Electricity Committee had done everything in their power to meet the Gas Company, short of allowing the Company to fix the amount the Corporation should charge for street lighting. It had been the intention of the Electricity Committee, as they would have been in a position to do so, to reduce the charge at present made for elecricity for public lighting; but this would not be possible if they had to spend their profits in fighting the Gas Company.

Bakewell Water Supply.—Mr. A. A. G. Malet, M.Inst.C.E., one of the Local Government Board Inspectors, held an inquiry at Bakewell last Wednesday into an application by the Urban District Council for power to borrow £1200 for the purpose of constructing an additional reservoir. Several houses on the hills around Bakewell are now without a supply from the Council, and the object is to serve 25 of these. In the course of the inquiry, it was elicited that the population of Bakewell at normal times is 3100, and that 95,000 gallons of water are used daily. The Inspector expressed surprise at the consumption—nearly 32 gallons per head per day—and told the applicants that they should go into the question of waste, as he considered this should meet their case entirely. It seemed to him an enormous consumption for the population. Dr. Barwise, the Medical Officer of Health for Derbyshire, who attended the inquiry, characterized a consumption of 30 gallons per head per day as being, from his point of view, very extravagant indeed.

A plate showing the fine new gas offices of the Birmingham Corporation, some particulars of the arrangements of which were given in the "JOURNAL" for the 4th ult. (p. 636), accompanies the current issue of the "City of Birmingham Gas Department Magazine."

In the last number of the "JOURNAL," reference was made to the early days of gas supply in Brighton. According to the "Daily Mail," there has lately died, at the age of 95, Mr. J. H. Hawker, who in 1845 went from London to Brighton, where he was the first gas-fitter.

The applications for £8000 of consolidated stock of the Newport (Mon.) Gas Company, at a minimum price of £110 per cent., recently invited by advertisement in the "JOURNAL," considerably exceeded the required sum; and letters of regret have been posted in respect of the amount not accepted.

We learn from Mr. R. G. Marks, of the Heat Distribution Company, that during the past month upwards of 100 distributors were sold in Burnley. He sends a few of the favourable opinions expressed by users of the appliance, of which more than 3000 are now at work in the town named, thereby materially helping to increase the day-load.

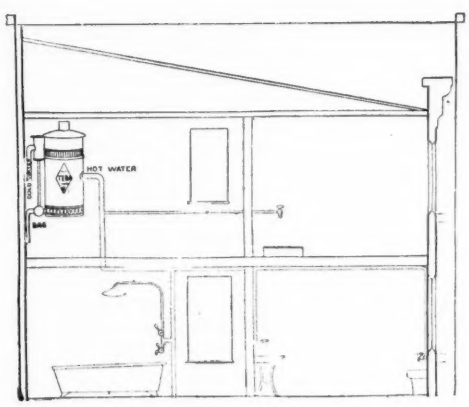
Messrs. Stewarts and Lloyds, Limited, have sent Section "C" of their catalogue, which contains descriptions of several designs of branch service connections for use with their steel gas, water, and air mains. Particulars of the method of attaching Stewarts' and the Woodall-Parkinson branch service connections to gas and water mains not under pressure will be found in the book.

Contracts have been entered into with Messrs. Bennis and Co., Limited, of Little Hulton, Bolton, for the supply of eight mechanical stokers for water-tube boilers for the Paris Gas Company; six stokers and self-cleaning compressed air furnaces for Lancashire boilers for the Birmingham Gas-Works; and a like number for the South Staffordshire Mond Gas Company. These are all repeat orders.

The report of the Directors of James Keith and Blackman Company, Limited, for the year ended the 31st of March last shows a net profit of £15,802. With the addition of £2082 brought forward, there is produced a total of £17,884. Out of this sum, the Directors recommend the declaration of a dividend at the rate of 5¾ per cent. per annum on the preference shares, and at the rate of 8 per cent. per annum on the ordinary shares (tax free). After allowing for depreciation, &c., and transferring £5000 to the reserve, there is a carry-forward of £2632.

At the London cart-horse parade held in Regent's Park on Whit Monday, the Gaslight and Coke Company gained three first prizes, one second prize, and a special prize. Photographs of some of the winners, with their carmen and drivers, form conspicuous features of the current number of the "Co-Partners' Magazine." Eight of the Company's motor-vans competed in the parade of the Commercial Motor Users' Association which took place the same day in Grosvenor Road. Several prizes were gained; a special drivers' prize of £2 being secured by H. J. Jarman, whose smartness and efficiency earned £12 3s. for him. A view of the van is given, with the driver upon it.

PARKINSON WATER HEATERS.



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BIRMINGHAM & LONDON.

GAS COMPANIES' STOCK AND SHARE LIST.

The Stock Exchange has had another most depressing week. So far as any enterprising public are concerned, business is about as nearly stagnant as possible. And it is the best markets that are the most perturbed. One might fairly have expected that the price of 75$\frac{27}{32}$ for Consols, to which reference was made a fortnight ago, would long remain undisplaced as the very nadir of low figures; but last Friday this was surpassed by a mark of 75$\frac{11}{16}$. Unless something semi-miraculous should arise to stay the distrust of an alarmed public, there is no reason why this price should long remain unbeaten. The opening day was very weak, and nearly every market was depressed. Government issues gave way, and Consols were freely sold $\frac{1}{8}$ lower. Rails were lower in anticipation of shrinkage in dividends. Americans were not strong. On Tuesday, there was a little rally in Rails—a welcome, though the sole, improvement. Even then the best prices were lost before the close. Gilt-edged things were worse, and Consols dropped $\frac{1}{4}$ for money and the account. Americans were rather better. Wednesday made a brave attempt to be cheerful. A smart rally in Consols recovered Tuesday's loss; and Rails participated moderately in the upward move. But on Thursday the effort was over, and the pendulum took a swing back again. Down went Consols; and Rails were only saved by the market being barely half alive. Friday was a wretched day—business moribund, and prices everywhere falling to pieces. As noted above, Consols were at their worst, and everything gilt-edged in very poor case. Nearly all Railway issues were lower, and Americans the same. Saturday might almost have been a closed day, for business was almost imperceptible. Where it could be discerned, there was weakness. Consols closed at 75$\frac{5}{8}$ to 75$\frac{7}{8}$—a fall of $\frac{3}{8}$ in the week. In the Money Market, there was an abundant supply, and accommodation could be had on easy terms, and discount terms relaxed. Business in the Gas Market was better. There was more activity on the whole, though the volume of business was not very fairly distributed among issues which the public generally keep an eye on. There were not many variations in quotation, and these were slight; but most of them were in the upward direction. In Gaslight and Coke issues, the ordinary had its full share of business, and was dealt in at steady figures, though a shade easier than last week—103 to 104. In the secured issues, unusual activity was shown in the maximum, which changed hands at 85$\frac{1}{2}$ to 86$\frac{1}{2}$. Besides this, there were only two deals in the debenture, at 76$\frac{1}{4}$ and 76$\frac{3}{4}$, and none in the preference. South Metropolitan was more dealt in than last week, and realized from 118$\frac{1}{2}$ to 120. In commercials, transactions in the 3$\frac{1}{2}$ per cent. ranged from 103 to 104$\frac{1}{2}$. Among the Suburban and Provincial group, British was done at 45 and 45$\frac{1}{4}$, Bournemouth preference at 14$\frac{1}{4}$ and 14$\frac{1}{2}$, Bromley "A" at 128$\frac{1}{2}$, ditto "B" at 98$\frac{1}{2}$, and Ilford debenture at 92$\frac{1}{4}$ and 92$\frac{3}{4}$. In the Continental companies, Imperial marked 183$\frac{1}{2}$ and 184$\frac{1}{2}$, and European from 19$\frac{1}{2}$ to 20. Among the undertakings of the remoter world, Primitiva realized from 7$\frac{5}{16}$ to 7$\frac{7}{16}$, ditto preference from 5$\frac{3}{32}$ to 5$\frac{5}{16}$, River Plate debenture 93$\frac{1}{4}$ and 95$\frac{3}{4}$, and San Paulo preference from 12 to 12$\frac{5}{16}$.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
1,551,868	Stk.	Apl. 12	5	Alliance & Dublin Ord.	73—78	..	6 8 2
374,000	Stk.	Jan. 12	4	Do. 4 p.c. Deb.	91—93	..	4 6 0
250,000	5	Apl. 12	7½	Bombay, Ltd.	6—6½	..	5 15 5
50,000	10	Feb. 29	15	Bourne- 10 p.c.	28½—29½	..	5 1 8
332,000	10	,,	7	mouth Gas B 7 p.c.	16⅝—16¾	..	4 3 7
75,000	10	,,	6	and Water Pref. 6 p.c.	14⅜—14⅝	..	4 1 4
380,000	Stk.	,,	13	Brentford Consolidated	258—263	..	4 18 10
330,000	,,	,,	10	Do. New	196—201	..	4 19 6
50,000	,,	,,	5	Do. 5 p.c. Pref.	118—120	..	4 3 4
206,250	,,	June 14	4	Do. 4 p.c. Deb.	95—97	..	4 2 6
219,055	Stk.	Feb. 29	11	Brighton & Hove Orig.	215—220	..	5 0 0
244,200	,,	,,	8	Do. A Ord. Stk.	156—159	..	5 0 8
490,000	20	Mar. 28	12½	British	44½—45½	..	5 9 11
120,000	Stk.	June 28	4	Do. 4 p.c. Deb. Stk.	91—93*	..	4 6 0
109,000	,,	Feb. 15	6	Bromley, A 5 p.c.	128—133	..	4 10 3
165,700	,,	,,	4½	Do. B 3½ p.c.	98—101	..	4 9 1
82,278	,,	,,	5½	Do. C 5 p.c.	117—120	..	4 11 8
55,000	,,	June 28	3½	Do. 3½ p.c. Deb.	78—80*	..	4 7 6
250,000	Stk.	,,	4	Buenos Ayres 4 p.c. Deb.	93—95*	..	4 4 3
100,000	10	—	—	Cape Town & Dis., Ltd.	2—3	..	—
100,000	10	—	—	Do. 4½ p.c. Pref.	4—5	..	—
100,000	Stk.	June 28	4½	Do. 4½ p.c. Deb. Stk.	74—78*	..	5 15 5
157,150	Stk.	Feb. 15	5	Chester 5 p.c. Ord.	110—112	..	4 9 3
1,513,280	Stk.	Feb. 29	5/9/4	Commercial 4 p.c. Stk.	108—110	..	4 19 4
560,000	,,	,,	5½	Do. 3½ p.c. do.	103—105	..	5 1 6
475,000	,,	June 14	3	Do. 3 p.c. Deb. Stk.	73—75	..	4 0 0
800,000	Stk.	May 31	4	Continental Union, Ltd.	83—86	..	4 13 0
200,000	,,	,,	7	Do. 7 p.c. Pref.	133—135	..	5 3 8
492,270	Stk.	—	5½	Derby Con. Stk.	122—124	..	4 8 9
55,000	,,	—	4	Do. Deb. Stk.	104—105	..	3 16 2
840,150	10	Jan. 31	10	European, Ltd.	19½—20½	..	4 17 7
16,160,600	Stk.	Feb. 15	4/14/8	Gas- 4 p.c. Ord.	103—104	−½	4 11 0
2,600,000	,,	,,	3½	light 3½ p.c. max.	85—87	..	4 0 6
4,062,235	,,	,,	4	and 4 p.c. Con. Pref.	100—102	..	3 18 5
4,531,705	,,	June 14	3	Coke 3 p.c. Con. Deb.	76—78	−½	3 16 11
258,740	Stk.	Mar. 14	5	Hastings & St. L. 3½ p.c.	93—95	..	5 5 3
82,500	,,	,,	6½	Do. do. 5 p.c.	—	..	—
70,000	10	Apl. 26	11	Hongkong & China, Ltd.	16½—17	..	6 9 5
131,000	Stk.	Mar. 14	7½	Ilford A and C	155—158	..	4 14 11
65,780	,,	,,	6	Do. B	123—125	..	4 16 0
65,500	,,	June 28	4	Do. 4 p.c. Deb.	91—93*	..	4 6 0
4,940,000	Stk.	May 15	9	Imperial Continental	183—187	..	4 16 3
1,235,000	Stk.	Feb. 15	3½	Do. 3½ p.c. Deb. Red.	88—90	..	3 17 9
200,242	Stk.	Mar. 14	6	Lea Bridge Ord. 5 p.c.	125—129	..	4 13 0
661,000	Stk.	Feb. 29	10	Liverpool United A.	219½—221½	..	4 10 3
718,100	,,	,,	7	Do. B.	158—160	..	4 7 6
306,083	,,	June 28	4	Do. Deb. Stk.	98—100*	..	4 0 0
75,000	5	June 14	6	Malta & Mediterranean	4⅜—4⅞	..	6 3 1
560,000	100	Apl. 1	5	Met. of 5 p.c. Deb.	—	..	—
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	101—103	..	4 7 5
541,920	20	May 31	3½	Monte Video, Ltd.	11½—12	..	5 16 8
1,775,892	Stk.	Feb. 15	4⅜	Newc'tle&G'tesh'd Con.	100—102	..	4 5 9
529,705	Stk.	June 28	3½	Do. 3½ p.c. Deb.	84½—86½*	..	4 0 11
55,940	10	Feb. 29	7/7/0	North Middlesex 7 p.c.	14—15	..	4 18 0
800,000	Stk.	May 15	8	Oriental, Ltd.	134—136	..	5 17 8
60,000	5	Mar. 14	8	Ottoman, Ltd.	7—7½	..	5 6 8
31,800	53	Feb. 29	13	Portsea Island A	—	..	—
60,000	50	,,	13	Do. B	130—133	..	4 17 9
100,000	50	,,	12	Do. C	127—130	..	4 13 4
398,490	5	May 15	8	Primitiva Ord.	7⅛—7⅜	+⅛	5 8 6
796,980	5	June 28	5	Do. 5 p.c. Pref.	4$\frac{15}{16}$—5$\frac{1}{16}$*	..	4 16 5
488,900	100	June 1	4	Do. 4 p.c. Deb.	96—98	..	4 1 8
312,650	Stk.	June 22	4	River Plate 4 p.c. Deb.	93—95*	..	4 4 3
275,000	5	Apl. 12	12	San Paulo, Ltd.	11¾—12¼	+⅛	4 18 0
150,000	10	,,	6	Do. 6 p.c. Pref.	11⅝—12⅛	..	4 18 0
125,000	50	July 1	5	Do. 5 p.c. Deb.	49—51*	+⅛	4 18 0
135,000	Stk.	Mar. 14	10	Sheffield A	235—237	..	4 4 5
209,984	,,	,,	10	Do. B	233—235	..	4 5 1
523,500	,,	,,	10	Do. C	233—235	..	4 5 1
90,000	10	May 31	7½	South African	8—9	..	8 6 8
6,429,895	Stk.	Feb. 15	5/9/4	South Met., 4 p.c. Ord.	118—120	..	4 11 0
1,895,445	,,	Jan. 12	3	Do. 3 p.c. Deb.	78—80	..	3 15 0
209,820	Stk.	Feb. 29	8½	South Shields Con. Stk.	157—159	+1	5 6 11
605,000	Stk.	Feb. 15	5/16/8	S'th Suburb'n Ord. 5 p.c.	122—124	..	4 14 0
60,000	,,	,,	5	Do. 5 p.c. Pref.	117—120	..	4 3 4
117,058	,,	Jan. 12	5	Do. 5 p.c. Deb. Stk.	120—122	..	4 2 0
502,310	Stk.	May 15	5	Southampton Ord.	105—107	..	4 13 6
120,000	Stk.	Feb. 15	7⅛	Tottenham A 5 p.c.	144—147	..	4 17 0
483,940	,,	,,	5⅝	and B 3½ p.c.	116½—118½	..	4 14 11
149,470	,,	June 28	4	Edmonton 4 p.c. Deb.	94—96*	..	4 3 4
182,380	10	June 15	5	Tuscan, Ltd.	8⅛—8⅜	..	5 15 11
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	97—99*	+⅛	5 1 0
236,476	Stk.	Feb. 29	5	Tynemouth, 5 p.c. max.	112—114	..	4 7 9
255,636	Stk.	,,	6⅞	Wands- B 3½ p.c.	141—144	..	4 15 6
85,766	,,	June 28	3	worth 3 p.c. Deb. Stk.	70—72*	..	4 3 4

Prices Marked * are "Ex Div."

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

SUPERINTENDENT. Sheffield Gaslight Company. Applications by July 15.
RESIDENT ENGINEER. No. 5601.
ASSISTANT GAS ENGINEER. West Bromwich Gas Department. Applications by July 17.
ENGINEER REPRESENTATIVE. No. 5606.
DRAUGHTSMAN. No. 5605.
ASSISTANT-CHIEF DRAUGHTSMAN. No. 5599.
SHOW-ROOM SALESMAN. No. 5604.
PUPIL-APPRENTICE. No. 5603.
GENERAL FOREMAN. Lancaster Gas Department.
CARBONIZING FOREMAN. Gravesend Gas Company.
SERVICE LAYER. Redditch Gas Company.

Appointments &c., Wanted.

REPRESENTATIVE (AUSTRALIA). No. 5607.
SULPHATE PLANT MAKER AND REPAIRER. No. 5592.
WATER-GAS ENGINEER. No. 5597.

Plant, &c. (Second-Hand), for Sale.

HYDRAULIC MAIN, DIP PIPES, MOUTHPIECES, &c. Swansea Gas Company.
LAMP COLUMNS AND LANTERNS. Barnsley Gas Company.
PREPAYMENT METERS, STEAM BOILER, FORGE AND ANVIL, CONDENSERS, &c. Centenary Gas Company, Glasgow.
STATION GOVERNOR, CENTRE VALVE, &c. Seaham Gas Company.

Patent Licences for Disposal, &c.

PURIFYING GAS.—TREATING COAL FOR COKING.—ACETYLENE GAS GENERATORS. Haseltine, Lake, and Co., 7 and 8, Southampton Buildings, Chancery Lane, W.C.

Correspondence Classes.

GAS ENGINEERING AND GAS SUPPLY. W. Cranfield, 11, Avondale Place, Halifax.

Stocks and Shares.

EXMOUTH GAS COMPANY. By Tender July 31.
SOUTHEND WATER COMPANY. London Mart. July 30.

Meetings.

COMMERCIAL GAS COMPANY. Cannon Street Hotel. Aug. 22. Twelve o'clock.
EUROPEAN GAS COMPANY. Finsbury House, E.C., July 16. Two o'clock.
TOTTENHAM AND EDMONTON GAS COMPANY. Gas-Works. Aug. 3. Three o'clock.

TENDERS FOR

Coal and Cannel.

BIRKENHEAD CORPORATION Tenders by July 18.
DARWEN GAS DEPARTMENT. Tenders by July 24.
EVESHAM GAS DEPARTMENT. Tenders by July 30.
EXMOUTH GAS COMPANY. Tenders by July 26.

Coal and Cannel (*continued*).

HAWORTH URBAN DISTRICT COUNCIL. Tenders by July 23.
HEYWOOD GAS DEPARTMENT. Tenders by July 13.
LYMM URBAN DISTRICT COUNCIL. Tenders by July 17.
MARKET HARBOROUGH GAS DEPARTMENT. Tenders by July 27.
MOSSLEY GAS DEPARTMENT. Tenders by July 18.
NEW MILLS URBAN DISTRICT COUNCIL. Tenders by July 16.
OLDHAM GAS DEPARTMENT. Tenders by Aug. 6.
PENRITH GAS COMMITTEE. Tenders by July 23.
SKIPTON URBAN DISTRICT COUNCIL. Tenders by July 25.
STOURBRIDGE GAS DEPARTMENT. Tenders by July 16.
SUNBURY GAS COMPANY. Tenders by July 25.
TONBRIDGE GAS COMPANY. Tenders by July 15.
TORQUAY GAS-WORKS COMMITTEE. Tenders by July 22.

Gasholder and Tank (Concrete).

HUDDERSFIELD GAS DEPARTMENT. Tenders by July 31.

Oxide of Iron.

BIRKENHEAD CORPORATION. Tenders by July 18.

Tar and Liquor.

LYMM URBAN DISTRICT COUNCIL. Tenders by July 17.

Valves, &c., for Gasholder Tank.

HUDDERSFIELD GAS DEPARTMENT. Tenders by July 31.